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NOTICES.—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

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The Government and the Dyestuffs Agreement

THE decision of the Government respecting the projected Anglo-German dyestuff agreement, which it is now stated is likely to be made known next week, is being awaited in all sections of the industry with interest and, indeed, with some anxiety. The extremely guarded statements made by Mr. Sidney Webb to the various deputations who have waited upon him give no indication of any definite opinion either way. It is understood that a Cabinet committee has had the matter under consideration for some time, and that they are finding the problem an extremely difficult one.

It is commonly recognised now that unless the British dyestuffs industry is protected in some form or other from unrestricted German competition it cannot hope to survive as a national industry for many years to come. At present it is protected by a Dyestuffs Act to which the Government of the day, with a Liberal Minister at its head, was fully committed. The present Government, however, have indicated a decided feeling in favour of free trade by the repeal of the McKenna duties, and another significant sign is the fact that the National Liberal Federation at its annual meeting at Brighton next week will have before it a resolution urging "the repeal of the Safeguarding of Industries Act, the Dyestuffs Act, and all other infringements of the policy of free trade during or arising from the Great War." It is, therefore, clear, although vast sums of money were invested in the dyestuffs industry on general promises of national support and although the Act itself was passed to run for ten years, that the British dyestuffs industry must recognise the possibility of all these assurances being cancelled, and its position exposed to the full and unrestricted force of German competition.

In these circumstances the Government's task of deciding is one of extreme delicacy. It is understood that their power in this matter takes the form of a simple right of veto. If they exercise it against the present agreement they will have to continue legislative protection or lay themselves open to the obvious charge of having allowed a growing British industry to be wrecked. They could only escape this charge by insisting on the continuance of the Dyestuffs Act in opposition to Liberal policy and by the support of the Conservative party. Although it is generally understood that the Cabinet committee are considerably divided amongst themselves, it is possible in the circumstances that some arrangement may be reached by which the agreement will be allowed to go through and the Government relieved of a very troublesome responsibility.

Combined Nitrogen Progress

THE steady development which is taking place in the industrial application of processes for the fixation of atmospheric nitrogen and in the manufacture of nitrogenous fertilisers therefrom is admirably illustrated in the review which Mr. H. J. Page has contributed to the recently published volume of *Annual Reports*, to which we referred last week. Within the past year or so matters relating to nitrogen fixation have not attracted the amount of attention that they did in the years immediately following the termination of the war, but steady and unobtrusive progress has been made, and it is only when the facts are grouped together, as they have been by Mr. Page, that one realises that before long these new sources of nitrogen must begin to exert a potent influence in the fertiliser industry.

One has, for instance, scarcely appreciated seriously that Billingham is already equipped on a basis of 100 tons of pure ammonia per day, which figure is capable of rapid expansion to 300 tons. In terms of sulphate of ammonia these outputs correspond respectively to 150,000 and 450,000 tons of ammonia per annum, and a reference to the latest report of the Chief Inspector under the Alkali Acts shows that the latter figure is in itself 100,000 tons more than the present total production of sulphate in this country. It would seem, in fact, that producers and merchants will be faced with something of a problem when it comes to the question of finding outlets capable of absorbing double the present production. Nevertheless, there is evidence of a steady increase in the consumption of nitrogenous fertilisers, and it is said that quantities available for the coming season will prove only just sufficient to meet the

world's requirements if the prospects of increased consumption are realised.

As regards the situation in countries other than Great Britain Mr. Page has collected some interesting facts which show, among other things, that in France the total output of combined nitrogen from all sources is 19,000 tons per annum, whereas the demand is about 110,000 tons. The Claude process, which under some circumstances is now definitely stated to have an advantage over the Haber method, is making good headway, being in operation at Béthune, where coke-oven gas is used as the source of hydrogen, while a plant is in process of erection in Spain, and others are soon likely to be found in Belgium, Switzerland, and Italy. A point which must concern producers of sulphate of ammonia not only in this country but the world over is the likelihood of any substantial reduction in the price of sulphuric acid, for if with a greatly increased output of sulphate the law of supply and demand calls for a reduction in fertiliser prices it is mainly the acid manufacturers from whom relief must be expected. Meanwhile, chemists are not disregarding any opportunity which may be presented for eliminating the necessity for sulphuric acid altogether, and it is said that in Germany extensive use is being made of the interaction of ammonia and calcium sulphate, thus utilising indigenous supplies of gypsum.

The Chemical Merchant's Future

MR. VICTOR BLAGDEN'S address at the annual meeting of the British Chemical and Dyestuffs Traders' Association produces at least one very definite impression. If the need of organisation was felt to be serious some years ago, it has become much more acute to-day. The number of points on which traders' interests are affected by legislation and regulations of various kinds is steadily increasing, and unless the merchants are able as a body to defend their own rights, or at least to state their own case, their interests are bound to suffer. The membership of the combined Association is now reported to be 128. It is not an immense community, but it is well worth keeping together and it has been organised on lines which enable it without undue strain to pay its own way. That in itself is a satisfactory position, and the responsibility of keeping the organisation going naturally becomes lighter with every addition to the membership.

For some years past the merchant not only in chemicals and dyestuffs but in business generally has been finding his position more or less challenged from various quarters. The "middleman," as he is called, is often regarded merely as an interloper whose profits deprive the manufacturer of a part of his reward and add a certain percentage of cost to the consumer. It is true, of course, that the man who distributes goods between production and consumption must necessarily make a living out of the process, but the advantages he confers upon the two classes he serves are too apt to be overlooked. In the past the merchant has played a very important part in the development of British trade throughout the world, and it is difficult to see how he can ever disappear from the machinery of commerce. In the case of large manufacturers, with ample financial and other resources, the outside agent, it is true, has been largely eliminated, but that does not mean that the function of the merchant has been dispensed with; it only means that the manufacturers have taken on the function themselves and have organised their own merchant service. There are, however, and always will be, a large proportion of manufacturers whose business is not large enough to justify them in attempting to do their own distribution direct. For this class the merchant is an indispensable servant, and any rewards he obtains himself are usually more than compensated for by the amount of business he is able to command which otherwise would be missed.

In addition to this, the merchant brings a large number of trade connections to this country from all parts of the world. In distant countries, where consumers have no supplies on the spot, they often find it convenient to send their collective requirements on to a British merchant or shipping agent, who is able to collect the goods they require from the various sources at his command, to arrange for their shipment, and to have them delivered with a minimum of inconvenience and expense at the consumers' doors. This kind of general work which constitutes the legitimate function of the merchant is of real value, and those engaged in it are protecting not only their own interests but the interests of British trade to a large extent in seeing that it is not subjected to unfair restrictions. Mr. Blagden's review of the Association's activities recalls a number of cases of regulations or proposals seriously affecting the merchant class in which the Association has intervened with useful results, and the work covered by his review fully justifies the appeal made by himself and Mr. Reynolds for the support of the trade.

Club and Federal Council

THE frank and straightforward letter which we publish this week from Mr. H. E. Coley, chairman of the Chemical Industry Club, makes clear two points which were rather obscure—namely, that the Club is not represented by himself or anyone else on the Federal Council, and that he attended the recent deputation to the Board of Trade purely in a personal and not in any representative capacity. These facts being clear, it seems to us unfortunate, though Mr. Coley is clearly not responsible, that the name of the Club was introduced at all. If, for example, Mr. Victor Blagden had been present and had been described as chairman of the Chemical Traders' Association, it would have been a reasonable inference that his Association shared the deputation's views. Or if Professor von Verboten had attended and been described as chairman of the Interessen-Gemeinschaft, again it would reasonably have been inferred that the I.G. was interested. A corresponding inference seems to us as inevitable in this case.

Mr. Coley says that we and our correspondent are "obviously misinformed," and that our action is based on "lack of information." Our correspondent may speak for himself. Our own views were based, not on "lack of information," but on the very definite official information as to what took place which was published by the Federal Council itself in its own official organ. In that official report not only is the Club's name introduced—clearly, as it now appears, without any warrant—but it is stated that Mr. Sidney Webb was informed "that the Federal

Council consisted of representatives from the Chemical Society, the Society of Chemical Industry, the Association of British Chemical Manufacturers, and all the other organisations connected with English chemistry." The words "representatives" from "all" the organisations connected with English chemistry clearly mean something different from what Mr. Coley's letter means.

What has happened in this case illustrates the need, where diplomatic or other relations are established between different organisations, of having them clearly defined. In the Club's relation to the Chemistry House scheme, the procedure was free from all ambiguity. These proposals were laid before the members, and the members decided on their action and appointed the chairman to represent them. Nothing could be simpler or more constitutional. We have tried in our neighbourly way, once or twice, to give a gentle constitutional twist to the activities of the Federal Council, because we are convinced that its position will be doubtful and its work hampered until it is frankly placed on a representative and authoritative basis. It is useless expecting a tree to produce flower or fruit while its roots remain in the air.

"The Outlook in Chemistry"

SIR WILLIAM POPE'S Trueman Wood Lecture, at the Royal Society of Arts on Wednesday evening, on "The Outlook in Chemistry" was a masterpiece of scientific learning, critical analysis, and literary compression. An address of some fifty minutes sufficed to cover all the amazing advances in physical science the last quarter of a century has witnessed, and to leave the hearers' minds freshened and informed as they might have been by the study of a substantial volume of chemical history. There are few things the Professor succeeds in doing badly; this will rank among the things he does supremely well. It was a fine historical etching of a great period—perfect in perspective and balance, nothing included that might have been spared, nothing excluded that counted in the story, here just the needed flash of illuminating comment, there an imaginative hint of things yet unseen.

Sir Herbert Jackson, who presided, described the lecture as a wonderful stock-taking survey, which, to be properly appreciated, needed to be read at leisure. The first part of it we publish in this issue; the final instalment will follow next week. The Professor's patient review of recent progress in physics led to a conclusion best stated in his own words, "Whilst the chemist at the end of last century had laid certain theoretical foundations to his science, more particularly those connected with the atomic theory, the doctrine of valency, the Mendeleef classification of the elements, and the vast network of organic chemistry which culminates in the determination of molecular constitution, all these achievements remained as theories or even in part as mere hypotheses until the sudden development of physics during the last twenty years or so transformed them into actual statements of fact. The history of science has never before had to record so dramatic and far-reaching a broadening of the horizon as that which has so recently unified chemistry and physics."

Points from Our News Pages

The Trueman Wood lecture, delivered by Sir William Pope on Wednesday, dealt with "The Outlook in Chemistry" (p.532).

The position of chemical and dyestuff merchants as affected by recent legislation and regulations was reviewed at the annual meeting by the Chairman (Mr. Victor Blagden) (p. 534).

Further notes of chemical interest are given in connection with the British Empire Exhibition, including a student's impressions (p. 536).

A summary is published of the annual report of the Inspectors of Explosives (p. 537).

The action by the Secretary of the Castner-Kellner Co. against the Gas Light and Coke Co. respecting the company's right to manufacture certain chemicals has been taken to the Court of Appeal (p. 540.)

According to our London market report, there has been some improvement during the week (p. 548), but our Scottish market report indicates no change (p. 551).

Books Received

CHEMICAL INDUSTRY PAMPHLETS:
Chemists and Their Work. By Stephen Miall.
The Quest for Colour. By A. T. de Mouilpied.
Wood Products. By T. W. Jones.
The Fermentation Industries. By Rex Furness.
Fine Chemicals. By T. W. Jones.
The Heavy Chemical Industry. By Rex Furness.
Chemistry in the Manufacture of Pigments, Paints and Varnishes. By C. A. Klein.
Chemistry in Relation to Foods. By G. W. Monier-Williams.
Published by Ernest Benn, Ltd., London. Price 6d. each.

THE AIMS AND FUTURE WORK OF THE RAMSAY MEMORIAL LABORATORY OF CHEMICAL ENGINEERING. By Professor E. C. Williams. London: University of London Press, Ltd. Pp. 40. 1s. 6d.

TEXTBOOK OF CELLULOSE CHEMISTRY. By Emil Heuser. London: McGraw Hill Publishing Co., Ltd. Pp. 212. 12s. 6d.

The Calendar

May 26	Institute of Physics: Annual General Meeting. Presidential address by Sir Charles Parsons. 4.30 p.m.	Royal Society's Rooms, Burlington House, Piccadilly, London
27	Society of Glass Technology: First Session, 3 p.m. Annual Dinner, 7 p.m.	University College, Gower St., London. Hotel Cecil, Strand, London.
29	Society of Glass Technology: Second Session. 2.30 p.m.	The University, Sheffield.
June 2	Society of Chemical Industry: Ordinary Meeting. 8 p.m.	Burlington House, Piccadilly, London, W.1.
3–6	Institute of Mining and Metallurgy: Empire Mining and Metallurgical Congress.	Conference Hall, British Empire Exhibition, Wembley.
4	Institute of Metals (Annual May Lecture): "Atoms and Isotopes." Dr. F. W. Aston.	Institution of Mechanical Engineers, London.
5	Chemical Society: Ordinary Meeting. 8 p.m.	Burlington House, Piccadilly, London, W.1.
11	Faraday Society and the Textile Institute: General Discussion on Physical and Physico-Chemical Problems Relating to Textile Fibres." 2.30 to 6.30 p.m.	Conference Hall No. 4, British Empire Exhibition, Wembley.
11	Society of Dyers' and Colourists' Conference: "An Historical Survey of Dyeing and Calico Printing." J. R. Hannay. 3 p.m.	Conference Hall. British Empire Exhibition, Wembley
11	Society of Dyers and Colourists: Annual Dinner.	Hotel Victoria, Northumberland Avenue, London, S.W.1.
12	Society of Dyers and Colourists: "Modern Methods of Dyeing." Professor A. G. Green. 11 a.m.	Conference Hall, British Empire Exhibition, Wembley.
18	Society of Glass Technology: Meeting.	Sheffield.
19	Chemical Society: Ordinary Meeting. 8 p.m.	Burlington House, Piccadilly, London, W.1.

"The Outlook in Chemistry"

The Trueman Wood Lecture by Sir William Pope

Sir William J. Pope, F.R.S., the Trueman Wood Lecturer for 1924, took as his subject "The Outlook in Chemistry" and the lecture was delivered at the Royal Society of Arts on Wednesday evening. Sir Herbert Jackson presided and there was a good attendance. The first instalment of the lecture is given below and the concluding portion will appear next week.

I BELIEVE, and I think my belief is well founded, that the historian of the future will mark the last twenty-five years as one of the really memorable stages in scientific progress. This brief period has witnessed such a broadening in the scientific outlook on the physical sciences as was never contemplated towards the end of last century: a broadening of the scientific horizon which has forced previously dissonant sections of the scientific community to regard their individual subjects and their main objectives of research from precisely the same standpoint of knowledge and of purpose.

Chemistry and Physics

Some obscurity may attach to this problem and a little explanation is desirable. During the nineteenth century the physicist was largely concerned with the determination of essential physical constants and the establishment of the primary relationship between the various forms in which energy manifests itself; it would be difficult to overestimate or overstate the intellectual beauty of the work of Thomas Young on the undulatory theory of light, of Clerk Maxwell on the properties of gases, or of Kelvin on thermodynamics and the theory of electricity. During roughly the same period the chemist dealt in the main with the material changes brought about in ponderable matter by chemical reaction; Lavoisier's recognition of the elements and his law of conservation of mass, Dalton's establishment of the atomic theory, Frankland's doctrine of valency and his work on organic synthesis, and the development of organic synthesis by Perkin, Baeyer, and Emil Fischer, are among the many expressions of genius directed towards purely chemical ends in this particular epoch. But whilst both physics and chemistry developed rapidly during the nineteenth century, they developed on what appeared to be quite divergent lines: they had but little community of method, of purpose or of outlook, and the chemist was fairly sharply distinguished from the physicist in his mode of attacking a problem and his conception of the meaning of natural phenomena. To the chemist, and especially the organic chemist, the internal constitution of the molecule was the main object of inquiry, whilst the physicist, in his dealings with matter and energy, concerned himself chiefly with extra-molecular happenings; this statement is, of course, not entirely true and it became less true as time passed on, but it is sufficiently accurate as indicative of the diversity of outlook.

During the last twenty-five years this state of affairs has entirely changed; the physicist has developed methods for penetrating into the atoms of which molecules are made up and of elucidating the manner in which the primitive atoms themselves are built up; he has provided simple explanations of many remarkable chapters in chemistry which had been worked out in an almost entirely empirical manner with but little theoretical basis. To-day physics and chemistry are but arbitrary sub-divisions of the great subject of natural philosophy; each of their students is a specialist cultivating some minute field of the whole domain, but all have the same fundamental conception of the nature of the non-living part of our universe.

The Outlook of Thirty Years Ago

It is very interesting to attempt a comparison of the outlook of the chemist of thirty years ago with that of to-day; to make such a comparison involves a brief review of the appearance of the chemical universe then and now, indicating the milestones in the path of progress and remarking on their significance.

Undoubtedly, the atomic theory enunciated by Dalton in 1803 remained for a century the corner stone of the chemical edifice. In essence, the atomic theory postulates that any chemical element is composed of inconceivably minute and similar particles called atoms and that the atoms of different elements combine in simple numerical proportions to form the ultimate characteristic units, the molecules, of chemically compound substances. It has always seemed to me that Dalton's atomic theory had, at the date of its enunciation, no sure foundation as a logical interpretation of observed facts, though it is naturally impossible to recover precisely the outlook of the chemist of a century ago; but whether the atomic theory represented a logical interpretation of experimental observations or whether it expressed an inspiration of a great generalising intellect, it is clear that until a few years ago the atomic theory remained a theory and nothing more. Ostwald, indeed, made an earnest attempt to present modern chemistry without the aid of the atomic theory, and, notwithstanding the recognised utility of the theory as a piece of chemical scaffolding, few held the opinion until quite recently that the atomic theory depicted an actual state of affairs or supposed it proven that atoms and molecules actually exist. After Dalton came Avogadro, who in 1811 stated the hypothesis that under similar conditions of temperature and pressure equal volumes of different gases contain the same number of molecules; again, no complete logical proof could be given that what was often erroneously described as Avogadro's Law represented an actual state of affairs; nevertheless, Avogadro's hypothesis still stands as the mechanism for rendering intelligible our methods for determining molecular weights.

Other great chemical monuments were raised from time to time: Prout's hypothesis stated in 1816 that the atomic weights are integral multiples of that of hydrogen, and become whole numbers if the atomic weight of hydrogen is taken as unity, and Mendeleef's periodic relationship between the atomic weights and physical and chemical properties of the elements, dating from 1869, had a profound influence on chemical thought. Prout's law was temporally discarded, to be resuscitated a century later in a slightly modified form as perhaps the most striking exemplification of the truth of modern views of the nature of matter and energy; Mendeleef's periodic classification of the elements remained for half a century as a purely empirical justification of a rapidly increasing belief that the elementary atoms are complex structures, and that all have a common origin.

The Doctrine of Valency

With the rapid development of organic chemistry came the enunciation by Frankland of the doctrine of valency with its immediate clarification of our knowledge of the molecular constitution of organic compounds; the introduction of constitutional formulæ by Kekulé gave a directional lead to the work of the organic chemist, and this mode of expressing the position relationships between the atoms composing a molecule, based upon the doctrine of valency, has furnished the theoretical network upon which the whole of the vast expansion of organic chemistry has been spread. Again, however, the doctrine of valency represented an empirical conception in the sense that it seemed impossible to give it any theoretical interpretation; at the same time, constitutional formulæ, although continually acquiring a more concrete character from stereochemical work based upon van't Hoff and LeBel's conception of the asymmetric carbon atom, were commonly regarded as not necessarily of greater significance than expressing a geometrical relationship which was to some extent parallel with the actual state of affairs. Possibly, however, it is not sufficiently grasped by chemists that the introduction of constitutional formulæ, with all their modern consequences, such as the recognition of the existence of definite groups or radicles as component parts of the molecule, constituted an entire revolution in chemical thought. I have myself discussed modern organic chemistry with veterans of before Frankland's day, and have been struck by their distrust of the idea that individual atoms of the component elements and specific groupings of those atoms exist as such in the complex molecule; the early conception seems clearly to have been that when two dissimilar atoms enter into combination, each loses its identity and becomes, as it were, fused into the other. To our predecessors with such an understanding of chemical

combination, the attribution of concrete signification to constitutional formulæ must have been peculiarly difficult.

A multitude of other steps in the development of the chemist's conception of his universe, many of them of importance, might be noted, but all are of the same category as the foregoing. The gradually extending chemical outlook of the last century resulted from the exercise of great experimental skill in the collection of observational facts, and in the logical generalisation from those facts which yielded the theoretical groundwork of modern chemistry; a wonderfully supple theoretical network was thus built up, but it was a network which, in the end, was regarded merely as theory, and not as necessarily presenting any real picture of what really exists as causative of the experimental results. This mode of conception has become obsolete during the present century; the atom and the molecule are now known to be realities, and much has indeed been disclosed concerning the way in which the elementary atoms themselves are built up. It is interesting to review the manner in which the new outlook has been gained before considering how it affects modern chemistry.

Atoms and Molecules

The first step towards a proof of the existence of Daltonian atoms and molecules as concrete entities obviously consists in devising methods for determining some constant relating to their absolute sizes, to the number present in a definite weight of a material or to the mass of an individual atom or molecule; such quantities as these are intimately related, and it is convenient, in tracing the development of the subject, to confine attention to but one of them. We may choose for this purpose the Avogadro constant, N, which represents the number of molecules contained in the molecular weight in grams of any species of matter. The mathematical development of the kinetic theory of gases by Clerk Maxwell, Clausius and van der Waals led to a method, based in part on measurements of the viscosity coefficients of gases, by which the Avogadro constant could be calculated; from measurements made on argon, the value $N=6{\cdot}2\times10^{23}$ was deduced. Naturally the calculation of this quantity provides no proof of the existence of atoms or molecules, because it is based upon the assumption that they do exist; the point which is of importance, however, is that many quite dissimilar methods for arriving at a value for the Avogadro constant are now available, and that all lead to values which are identical within the limits of experimental error.

Thus, the botanist Robert Brown noted in 1827 that very finely divided particles suspended in a liquid appear on microscopic examination to be in a state of perpetual agitation and some sixty years later it became admitted that this incessant movement is due to the bombardment of the tiny solid particles by the swiftly moving molecules of the liquid medium itself. If this is the case, the solid particles suspended in a liquid should distribute themselves vertically according to the same law as governs the pressure of the atmosphere at various altitudes; very careful series of observations were made by Perrin of the concentration of uniform particles of gamboge at different altitudes in a thin layer of liquid, and it was shown that, interpreting these data as representing an equilibrium condition between the dispersive tendency of the bombardment and the sedimenting effect of gravity upon the particles, a method for calculating the Avogadro constant was obtained. Perrin thus calculated the value $N=6{\cdot}83\times10^{23}$, which, considering the difficulties of the experimental work, may be regarded as identical with the value calculated from the viscosity of argon. The remarkable nature of this correspondence will be realised when it is noted that a parallel is being drawn between the weight of a gram-molecule of such a gas as hydrogen, namely, two grams, and that of the gram-molecule equivalent of the relatively enormous gamboge particles, which is of the order of 100,000 tons; also that an atmosphere of hydrogen round the earth would have its density diminished to one-half by the action of gravity at an altitude of about 80 kilometres whilst a similar diminution to one-half density occurs at a height of 0·02 to 0·03 millimetre in the suspensions of gamboge.

Again, the late Lord Rayleigh pointed out that the diffusion of light by a gas is due to the gaseous molecules acting as diffracting particles; by an argument which need not now be discussed he traced the blue colour of the sky to this effect and gave a method for calculating the Avogadro constant. This method, applied with modern refinements, has yielded the value $N=6{\cdot}54\times10^{23}$, again sensibly identical with those furnished by the previously entirely distinct methods.

Radioactivity

By far the widest expansion in modern knowledge of the constitution of matter and indeed also of energy is that which has resulted from the study of radioactivity. Apart from the pioneer work on radiant matter by Crookes, the discovery of radioactivity in 1896 by Becquerel and its association shortly afterwards with radium by Madame Curie mark the opening of a fresh chapter in the development of science; so striking has been the broadening of the chemical outlook under the influence of the rapid advance in the study of radioactivity that it may be useful to note a few points of special importance. The most fundamental of these is perhaps the identification by Sir J. J. Thomson of the β-particle as the particle or unit of negative electricity and the demonstration that the α-particle, thrown out during the first stage of the atomic degradation of the radium atom, is the atom of helium carrying one unit charge of positive electricity. Following this as clearing up our ideas on fundamental chemical theory is possibly Rutherford's conception of the structure of the chemical atom; in this it is conceived that the atom consists of a nucleus, minute in comparison with the total volume occupied by the atom, which contains all the particles of positive electricity and, in the case of all the elements but hydrogen, a definite number of particles of negative electricity; the nucleus carries a positive charge equal to the difference between the number of positive particles and the smaller number of negative electrons composing the nucleus. The positively charged nucleus is in electrical equilibrium with the much larger external atomic domain by reason of the presence in the latter of negative particles or electrons equal in number to the nuclear charge. Since the property of mass is chiefly associated with the positive particle of electricity, the electron having a mass only about 1/1800th as great, the atomic weight of an element becomes very nearly the number of positive particles contained in the nucleus; the atomic weights should thus be practically whole numbers, multiples of the unit atomic weight of the lightest element, hydrogen, in accordance with Prout's hypothesis of 1816. Further, one of the most important characteristics of an element should be the positive charge on the atomic nucleus, or the number of electrons in the external atomic domain; this is the atomic number which was first defined by Moseley, who showed the simple relation which exists between this constant and the spectrum of the light evolved by an element when bombarded by β-particles. As connecting this strange new development of science with earlier knowledge it may be noted that the most accurate method for determining the Avogadro constant depends upon the measurement of the charge carried by the electron or β-particle; Milliken thus determined the value for N as $6{\cdot}062\times10^{23}$, a number approximately identical with those previously quoted.

(To be continued next week.)

No Substitute for White Lead

Mr. E. Holden (head of the Building Trades Department of the Gloucester Technical School) lectured on Friday, May 16, at the Birmingham Corporation Central School of Arts and Crafts on "The Romance of Lead in Industry." Mr. Wigley, President of the Birmingham Master Painters' Association, presided.

Mr. Holden said it was expected that the Government would shortly introduce a Bill to deal with the use of white lead in painting. He could not say whether such a Bill would prohibit the use of white lead for the painting of interiors, but it was considered certain that it would include regulations for the use of white lead in painting.

Providing the users of lead would exercise common hygienic principles regarding cleanliness, it would be quite unnecessary to give "prohibition" serious thought. Up to the present there had not been any substitute for white lead in paints which equalled the character and qualities of that material.

A practical demonstration was given of the new hygienic method of damp rubbing down of paints with waterproof sand paper, which it was stated lasts from eight to twelve times as long as ordinary sandpaper.

Chemical Merchants and Their Trade Policy

Chairman's Review of Recent Activities

At the annual meeting of the British Chemical and Dyestuffs Traders' Association the Chairman (Mr. Victor Blagden) reviewed the position of the merchant community as affected by legislation and departmental regulations.

In connection with the annual meeting of the British Chemical and Dyestuffs Traders' Association on Thursday, May 15, at the Cannon Street Hotel, London, a luncheon was held, at which over 85 representatives were present.

The Chairman's Review

Speaking of the formation of the Association a little over twelve months ago, the Chairman (Mr. Victor Blagden) said that the result was that in the present organisation—The British Chemical and Dyestuffs Traders' Association, Ltd.—they had a thoroughly well-established, fully representative, and financially sound trade protection society which had already performed good work and obtained numerous concessions for members in particular and the trade in general. The Committee was formed of equal numbers from the two organisations. They had worked hard and the members had all pulled together for the common good. In their Secretary they had a really live wire who took the keenest interest in the welfare of the Association.

During the period under review the Committee decided to register the Association under the Companies (Consolidation) Act, 1908, as a non-trading concern. One object the Committee had in view was that as a joint-stock company members were not liable, except for a nominal amount, for any liabilities incurred. Further, the registration of the Association gave it a certain status with Government Departments. This was shown by the fact that the Inland Revenue authorities agreed to allow members to count their annual subscriptions as a business expense when making returns for Income Tax. Something like 36 new members had been elected during the year and further applications were promised from a number of firms. They had now 128 members and he would like to see this increased to, say, 150. Against this there was the loss of about 20 firms who had discontinued membership. The causes for these resignations were in no way connected with dissatisfaction with the Association's activities, but were generally due to firms going out of business altogether or closing their chemical departments. It was very satisfactory that, during a period of unexampled trade depression, the membership should show a good net increase. It was certainly gratifying to see the large number of members who, when renewing their subscription in January, voiced their appreciation of the services rendered and the assistance they had received. In February and March they carried out extensive propaganda in the provinces and held meetings in Manchester and Glasgow, while Liverpool was also visited. The result was very satisfactory, but there was still room for expansion in these three important industrial centres. Many firms in the North were of opinion that the Association was primarily a London Association. He took that opportunity of stating that the Association rendered identical services to all members whether situated in the provinces or in London. At the end of December, after meeting their liabilities, they finished up with a few pounds in hand. So far this year the income had been satisfactory and it was estimated that a credit balance of a small amount would be recorded when the year concluded, provided the registration expenses were spread over two or three years.

The Association's Policy

Discussing the question of policy the Chairman said that the Association was first and foremost a merchant traders' protection society. It was run on the democratic basis of one firm, one vote. It was a non-trading concern; in fact, it was strictly prohibited from trading or profit-making under its Articles. When chemical or dyestuffs traders' interests were unfairly encroached upon or any point or principle raised affecting those interests either by a Government or by some commercial or industrial interest, the Association stood ready and prepared to resist such attacks. The Secretary and staff were full-time paid officials and had no connection with any trading concern, and the continual stream of confidential matters from members were treated as such.

The Association had rendered valuable assistance to members in connection with the German (Reparations Recovery) Act. During the last twelve months there had been continual changes in the amount of the levy and on every occasion they had correctly advised members of those changes some days before they actually took place. Further, when the levy payable by the British importer could not be recovered from the German exporters, in consequence of the German Government's default, the Association hammered away at the Treasury and carried out a wide press propaganda, with the result that matters were put right. During this difficult period, lasting about four months, it was made clear that they were not concerned with the amount of the levy—it could be 50 per cent. or 5 per cent.—so long as the British importer could recover it from the German exporter. It was a point the Treasury did not contest; they admitted its correctness and eventually withdrew the burden from British shoulders. In not a few cases they had assisted members successfully to contest Customs claims for this levy on goods that were not liable. He referred to goods, possibly of German origin, but purchased in and consigned from a country outside Germany. There was always a query by Customs on such goods and on numerous occasions the Association obtained satisfactory settlements for members. The levy now stood at 5 per cent. and matters are working fairly smoothly and there was some reason to think that in the near future the Act would be repealed and the levy dropped altogether. In this matter the Association had rendered signal service not only to members but to the whole trade of the country.

Dyestuff Licences.

I now come (the Chairman said) to a matter on which I should not be reflecting the general opinion of our members if I stated that merchants had received anything approaching fair treatment. Your Committee are not satisfied. I am sure you are not satisfied with the attitude of the Government Department concerned and the Dyestuffs Advisory Licensing Committee towards merchanting interests. The Dyestuffs Act continues to be operated in a manner which leaves much to be desired. It is unfortunate that the Board of Trade refuses to publish particulars of all licences granted. I believe that much of the mistrust and the many rumours of preferential treatment are unfounded, but I think the Board of Trade and the Licensing Committee have themselves to blame for this unsatisfactory state of affairs by their persistence in carrying out their work in a secretive manner. The importance of the various consuming industries seems to have been lost sight of altogether. They appear to be willing to inflict any handicap involving the production of inferior finished goods so long as they can, by refusing to grant an import licence, push an unsatisfactory home-made colour. Time and again their experts have over-ruled the expressed opinions of consumers on this point. Merchants are usually requested to furnish the Licensing Committee with information that has little or no bearing on the application in question, such as the names of their customers. When this is given further quibbles are raised with correspondence over a period of three or four months. Why cannot the Licensing Committee make up their minds what information they require at the start and ask for the same? Do they hope, as is often the case, that by prolonging their investigations the consumer will get tired or cannot wait for his colour? We have applied time and again to be given representation on behalf of dyestuffs traders on the Licensing Committee. We should be there to see that merchants received fair treatment. With one vote we should have no power. It is difficult to understand why our request is so persistently refused when it is remembered that over 75 per cent. of the applications dealt with by the Licensing Committee come from merchants. It has been suggested that our presence on the Committee might be inconvenient. I can assure you that your Committee intend to continue to make the strongest possible protests against the unfair treatment meted out to dyestuffs traders, and I

therefore appeal to those members who are interested as traders in dyestuffs to support the Association to the fullest extent.

The Proposed Agreement.

Recently, dyestuffs merchants have been concerned about an agreement which is said to be in course of preparation between the British Dyestuffs Corporation, Ltd., and the Interessen-Gemeinschaft. We met the Board of Trade and asked to be furnished with particulars of the agreement. We were told that it was not at that time in a sufficiently advanced form and that publication at that stage would, in their opinion, prejudice the position. We were requested to submit a memorandum giving our views and stating in what way we desired the merchanting interests considered and protected. This we have done. We are now awaiting developments.

We have issued to members lists of Reparation colours. So far we have failed to induce the Board of Trade to allow a special discount to merchants purchasing supplies from Reparation stocks for re-sale, but further representations are being made at the moment on this matter.

Safeguarding Act Difficulties

Referring to the Safeguarding of Industries Act, Part I. the Chairman said that during the past twelve months the Association had performed a vast amount of valuable work on behalf of the trade in general and members in particular. They would all remember that some six months ago Customs decided to ignore invoice values and assess the value of dutiable goods on their own estimate. This meant that an importer could not calculate the cost of his goods until they were actually landed and cleared. Business, under such uncertain conditions, was impossible. Traders had met with a good many handicaps, hindrances, and difficulties in connection with the working of this Act, but this was about the worst. They interviewed the Customs officials, with the result that they continued to accept *bona fide* invoices as the value of goods. They gave the Department to understand that they thoroughly appreciated their difficulty in being unable to differentiate between genuine and collusive invoices, the latter specifying a lower value than was actually paid by the importer for the goods. The Association offered their assistance to bring about the conviction of firms adopting such practices and thus competing on an unequal basis with firms who declared correct values.

While he had no comment to make on the desirability or otherwise of protecting certain essential industries, he had no hesitation in stating from a close and continued experience that Part I. of the Safeguarding of Industries Act was doing a great deal more harm to the trade of this country, especially re-export business, than was necessary in order to provide a shelter for such industries. So far as chemicals were concerned it had cut them off completely from the freedom of international trade in which they had previously played a leading part. This country has lost its name and its place as the best source of supply for every and any chemical, whether made here or not. They had been trying to get the Treasury to introduce a system of "bonding" of goods liable to key industry duty. They stated their case very fully in a memorandum some time ago, but so far the Department had not seen their way to bring about the desired improvement. They were, however, still pursuing this matter and were hopeful that the request will be granted. They had had to deal with many cases of hold-up and delay in clearing goods through Customs. Frequently importers had had large consignments of non-dutiable goods held up in this way while the analytical test was being carried out. The financial loss on account of demurrage on barges had often been considerable. When such cases were brought to their notice they had been able to accelerate the release of the goods. In the commercial world the Association had been vigilant and active in protecting its members' interests. They had dealt with important matters with wharfingers on the question of their right to put a general lien on goods. In this matter they obtained an important verdict in their favour. They had taken all possible action in connection with the revision of railway freight rates. In connection with the recent considerable increases in the Port of London Authority charges, the Association was now in the midst of negotiations and it was already evident that they would obtain material concessions for the whole trade.

Mr. F. T. T. Reynolds (Millwards Merchandise, Ltd.), vice-chairman, in proposing a vote of thanks to the chairman, referred to the important part played by the trader in developing overseas trade, and pointed out the necessity of organisation to protect the trader's interests.

Chemical Industry Club and the Federal Council

To the Editor of THE CHEMICAL AGE.

SIR,—My attention has been drawn to the last issue of your journal in which a letter from "A Member of the Club" and an editorial supporting the opinions expressed therein are published.

As both you and your correspondent are obviously misinformed, and as your action based on that lack of information may lead to a wrong impression being produced, I shall be obliged if you will allow me to make it clear—

(*a*) That I did not attend the deputation referred to as Chairman of the Chemical Industry Club Executive Committee.

(*b*) That I do not represent the Club on the Federal Council.

(*c*) That the Club is not represented on the Federal Council.

(*d*) That I am a member of the Federal Council by invitation.

May I add that I am glad to find you advocating the policy of the Club, which I think I may claim to have fostered and built up for nearly eight years, both in my capacity as Hon. Secretary and recently as Chairman of Committee.

It may prevent further misunderstanding of this kind if I also make it clear that the Club is only represented on one outside body at present, namely, the recently-appointed committee to further the proposed Chemistry House Scheme. With the consent of the Club Executive I have accepted the invitation of the Federal Council to represent the Club on that Committee.—I am, etc.,

H. EDWIN COLEY.

Chemical Industry Club,
2, Whitehall Court, London, S.W.1.
May 19, 1924.

[We are glad to publish Mr. Coley's letter, which, we are sure, will be read with satisfaction. His devoted work for the Club has often been alluded to in THE CHEMICAL AGE, and is too well known to all acquainted with the history of the Club to make any reminder necessary. The impersonal questions of policy involved, which are all that concern us, are referred to in our editorial notes.—ED. C.A.]

Fertilisers and Soil Acidity

To the Editor of THE CHEMICAL AGE.

SIR,—Referring to your editorial matter on "Fertilisers and Soil Acidity" appearing in your issue of May 3, and to the letter of Mr. Thomas Darling in the current issue, does not ammonium sulphate itself produce acid conditions on certain soils, independently of any free acid that may be present in the salt at the time of application?

Experiments at Woburn and at Rothamsted have demonstrated that on soils deficient in calcium carbonate acidity does develop after ammonium sulphate has been used consistently for some years. The theory has been advanced that this is due to micro-fungi attacking the sulphate, absorbing its ammonia, and setting free sulphuric acid, which in its turn reacts with the organic calcium salts of the soil, setting free their acids. These acids accumulate in the soil, which may become so sour as to prevent a plant of barley.

It has been found that such conditions exist only where there is an acute shortage of lime in the soil, and that they are remedied when this shortage is made good.—I am, etc.,

London, May 15. J. BERTRAM WARD.

To the Editor of THE CHEMICAL AGE.

SIR,—I find I am wrong in the price I state which appeared in your publication of the 10th inst. The difference between ordinary sulphate of ammonia and neutral sulphate of ammonia is 23s., and not 13s., as stated by me.—Yours, etc.

THOMAS DARLING.

Berwick-on-Tweed, May 17.

The British Empire Exhibition

News and Notes of Chemical Interest

THERE are some compensations for an exhibition not being ready at the opening date, one of which is that a frequent visitor finds something new and different each time he goes. Each week there seems to be more happening, and there is an increase in liveliness all round. The numbers of visitors on Saturdays also are beginning to make a series of records. In some cases, however, the material progress made has led to such inconveniences as wet paint and varnish. One stand we noted in the Chemical Section, which appeared to be complete three weeks ago, has actually had all the exhibits removed in order that the structure may have another coat of varnish, while another stand has been partly dismantled for structural additions. All this is somewhat confusing to the visitor, and appears to be movement in a retrograde direction, but as we have pointed out before these little blemishes are not noticeable to any extent in view of the standard of completeness of the whole. Arrangements on the whole are now working much more smoothly, particularly in connection with the power supply and the postal service, which were formerly not up to expectations. The improvement in the power supply is particularly welcome because many of the stands in the Chemical Hall have small displays in motion, or effects depending on artificial lighting, which always tend to form a centre for a crowd. W. J. Fraser and Co. have a small portable electrically-driven stirrer, which may be seen going, which adds to the interest of their exhibit. Reference to this display suggests that it seems a little unfortunate that there is not more of the engineering side of chemistry in evidence and a little less soap and perfumery. Of course, most of the engineering firms have exhibits in the Palace of Engineering, but even there one or two well-known names are missing. The firm of Manlove, Alliott and Co., Ltd., however, have a display of oil-extraction plant in the Nigerian Building which we hope to describe in an early issue.

Quite a number of the stands in the Chemical Section which recently presented an unfinished state are now ready. These include Carnegie Brothers, Herbert Green and Co., J. F. Macfarlan and Co., the Salt Union Ltd., and Thomas Tyrer, Ltd.

A Poster

A poster has appeared on some of the hoardings in London which draws attention to the Chemical Section at Wembley in the following terms :—

CHEMISTRY.

THE ALCHEMIST GATE.

"It opens into the Chemical Section of the most wonderful of all exhibitions. You see the marvels of the laboratory applied to industry. You behold how British brains have penetrated behind the veil of nature. No story of Arabian Nights is half so fascinating. British science displays its treasures."

The design is quite good; above the wording, which is in old fashioned but plain lettering, there is a picture showing a pink liquid in a flask against a background of green, with a similar flask being warmed over a green bunsen burner. Below is the Wembley lion and the words, "British Empire Exhibition." On the whole it is a very fair sample of modern poster advertising, and should prove of considerable publicity value for the British chemical industry as well as directing the attention of the general public to the chemical section.

Science in Food Preservation

The Food Investigation Board of the Department of Scientific and Industrial Research have an interesting exhibit in the Food Section, opposite the chocolate-making exhibit, in the Palace of Industry. This deals entirely with problems concerned with the preservation of food, and is supplementary to the exhibits in the Government Building which have been arranged by the Fuel Research Board and other sections of the Department. The central portion of the display in the food section deals with the storage of apples, and shows how oxygen is absorbed, carbon dioxide given off, and a temperature maintained slightly above that of surrounding objects. The two last-named phenomena are demonstrated by means of two large air-tight wooden cases, one of which contains apples and the other plaster dummies. Gas is evolved from the apples, and this passed through baryta water, a copious precipitate showing that the product is carbon dioxide. To show the absorption of oxygen an air-tight balance is used, the oxygen consumed adding to the mass of the side containing apples. The carbon dioxide evolved is absorbed by caustic soda in the box, and the oxygen entering can not only be seen bubbling through a tube of mercury, but in addition it is passed through a meter. Other exhibits on the same stand show the method of controlling the temperature during the chilling of meat and fish, a number of photographs illustrating the diseases of apples, samples of the acids, salts, esters and sugars extracted from apples, and other similar items, which form a very instructive display of the scientific work now being done in connection with food supplies.

The Chemical Science Exhibit at Wembley

A Student's Impressions

EXHIBITIONS (a student-correspondent writes) are often disappointing; the too-efficient activities of the advertisement manager raise hopes which are not realised actually. With the British Empire Exhibition this is not so, and nowhere is it shown better than in the Chemical Section, which is eminently worthy of British chemistry and fully represents its infinite ramifications. The Section occupies about one-sixth of the floor of the Palace of Industry, and its compactness and unity are emphasised by the frieze running round the whole area. Incidentally, we wonder why no women chemists are depicted thereon.

The trade exhibits are tastefully arranged and of great variety. Interest succeeds interest, and the difficulty of tearing oneself away from one stand is equalled only by the pleasant anticipation aroused as one goes on to the next. Their preparation must have entailed enormous labour and expense. They are too numerous to be mentioned individually, but the exhibits of Messrs. Bryant and May, Messrs. Burroughs Wellcome, the crystals of various alums shown by Messrs. Spence, the stands of the various perfume firms, and the spectacular exhibits of the dye manufacturers, catch the eye of the most casual visitor.

In the centre of the Section is the scientific exhibit, showing examples of contemporary chemical investigation from almost all the colleges and institutions of the country. This exhibit is of especial interest to the student of chemistry; one is brought into touch with the recent advances of the science by a means far more effective than the mere reading of reports in scientific journals. Starting from models illustrating fundamental facts, one goes on to illustrations of problems arising from further discoveries, and here it is interesting to see the portraits of those who have brought about this advance, from the alchemists onwards. The provision of signposts in the exhibit, indicating the direction to be followed, would be a great help. We ourselves were fortunate in being conducted round the Section by Mr. W. J. U. Woolcock, the organiser of the Chemical Section, but the unaided visitor might easily have difficulty in finding continuity in the exhibit.

Some of the models are very ingenious. We particularly admired Professor Thorpe's model illustrating the change in the angle between two bonds of a carbon atom caused by change in the angle between the other two bonds. The series representing the growth of the atomic theory, from Dalton's idea to the latest work of Dr. Aston, and the models of crystal structures are especially noteworthy, and very clearly explained. The unique collection of alkaloids and the series of colloids also attracted our attention, while the glass-blowing in some of the apparatus aroused our envious admiration. Perhaps the interest of the Section to the non-technical visitor would be increased if some of the scientific exhibits were explained in more detail.

The Chemical Section alone could well occupy half a day, and our grateful thanks are due to Mr. Woolcock, through whose guidance we were able to see the whole of the exhibit thoroughly, in spite of the short time at our disposal.

British Industries Fair

Chemistry at the Birmingham Section

THE Birmingham Section of the British Industries Fair, which closed yesterday (Friday), contained considerably more exhibits of chemical interest than the London Section, as the following notes indicate, although the display here also felt the effects of the Wembley Exhibition, and was somewhat smaller than usual.

Paints and Lacquers

THE FREDERICK CRANE CHEMICAL CO., Birmingham, were responsible for an extremely good display of celluloid lacquers and varnishes and celluloid spraying and brush enamels in a variety of colours.

THE NECOL INDUSTRIAL COLLODIONS, LTD., were represented by an atractive exhibit of lacquers and enamels for metal, glossy or matt, in all colours, and plastic wood, household cement in tubes, tarnish preventive for bright metal-ware, etc., were featured.

A practical exhibit of the Naylor finishes, under actual conditions as they would be applied by the user, was made by NAYLOR BROS. (LONDON), LTD., of Slough, Bucks.

Electro-plating Requirements

MESSRS. W. CANNING AND CO., LTD., of Birmingham, had a stand upon which there was a good selection of chemical requirements for industrial processes: electro-plating equipment, nickelling salts and salts for use in the non-ferrous trades, as well as mops, polishes, and lacquers.

Electro-plating barrels, industrial chemicals and materials, lacquers, hot and cold, finishing compos and scratch-brushing fluids, and hardening compounds, etc., were featured on the stand of THE HOCKLEY CHEMICAL CO., LTD., Birmingham; on both these stands the effectiveness of the machinery was demonstrated on practical lines.

Gas Works Products

THE INDUSTRIAL RESEARCH LABORATORIES of the Birmingham Gas Department had a stand on which important metallurgical tests, tensile and compression, were made, and there were also on view a number of furnaces which have recently been installed in various firms in Birmingham and district, and are capable of attaining temperatures ranging from 1,250° to 1,400° C., such as are required for enamelling and ceramic firing. There was also shown a number of different forms of temperature measuring instruments and the latest types of thermo-couples, also a recent design of thermo-couple potentiometer, made by THE CAMBRIDGE INSTRUMENT CO.

THE SOUTH STAFFORDSHIRE MOND GAS CO. showed a large range of by-products derived from coal in the Mond process of gas manufacture; they emphasise the potentialities of coal. The products displayed included acid and weather-resisting bituminous paints which hitherto have been produced only in black, but on this occasion they were shown in a variety of colours. Disinfectants, sheep and cattle dips, and horticultural washes, fertilisers, weed killers and wood preservatives were displayed. These are derived from the oils produced in the manufacture of Mond gas which, though unlike ordinary gas tar oils, being free from carbolic and other poisonous substances, possess nevertheless a germicidal value. An interesting exhibit was a large glass bottle containing sulphuric acid in which were placed side by side two iron rods, one treated with "Melanoid" light red paint and the other with a red oxide oil paint. The extreme resistance of the former to acid attack was thus well illustrated.

Other Exhibits

Iron and steel paint, which is claimed to be a reliable anti-corrosive for all iron and steel structures, was displayed by the ATLAS PRESERVATIVE COMPANY, LTD., of London. It is stated that it will cover 700–900 sq. ft. per gallon, and is durable, elastic and waterproof.

Spraying plant for the spraying of paints, varnishes, lacquers and enamels was shown by the MIDLAND FAN CO., LTD., Aston Road, Birmingham.

MAJOR AND CO., LTD., displayed "Solignum," an effective wood preservative; it is said to be invaluable as a protection against attack by white ants and other insect pests. There is a soluble form of the preservative for the treatment of diseases of rubber, cocoa and other trees.

THE FEED WATER SPECIALISTS CO., of Liverpool, showed Algor colloids—a recent development of colloid chemistry—which are used by steam users for stopping incrustation, corrosion, pitting and priming in boiler plants. There was, too, on this stand a chemical compound for destroying rust, and which also acts as a lacquer for afterwards protecting the metal.

Report of Explosives Inspectors

Changes in the Chemical Departments

THE annual report of H.M. Inspectors of Explosives for 1923 has just been issued by the Stationery Office, Kingsway, London (1s.), and contains the record of the inspection work during the year and of the various accidents that have occurred in connection with explosives. In July a short amending Act, cited as "The Explosives Act, 1923," was passed conferring further powers upon certain Government authorities concerned with explosives and amending the rules dealing with the employment of young persons in danger buildings.

Change of Chemical Advisers

The Inspectors record with considerable regret that the long connection between the Explosives Department and the Dupré family has at last been severed. This connection actually dates from the year 1871, when the late Dr. Auguste Dupré, F.R.S., was invited to assist in the investigation into the cause of the great guncotton explosion at Stowmarket, which occurred in August that year. On Dr. Dupré's death in 1907, his twin sons, Messrs. P. V. and F. H. Dupré, were entrusted with the chemical work of the Department, which they carried out until March 31 last, to the entire satisfaction of the Department, and, they have reason to believe, with the complete confidence of the explosives industry. For reasons of public policy, however, it was decided to transfer the duties of the chemical advisers to the Research Department, Woolwich. This was done at the beginning of the financial year, Mr. F. H. Dupré being appointed chemist-in-charge of the particular department dealing with their work, so that we continue to have the benefit of his exceptional experience.

Chemical Tests

The total number of samples examined during the year amounted to 281 as against 357 in the previous year, the reason for this decrease being that for the first few weeks after the transfer of the work to the Research Department they refrained from drawing samples as freely as usual so as to reduce the work during the transition as far as safely practicable. Of these samples 15 were for the Mines Department and five in connection with the Testing Station. The great majority of the samples examined were found to be of good quality and correct in composition as specified in the Authorised and Permitted Lists. In 25 cases, however, a slight deviation from specification was found, in two others the Heat Test was slightly below the standard, and one sample showed a tendency to exudation of nitro-glycerin. In each instance the attention of the manufacturer was called to the defect, which in no case was of a serious character. Nine samples of new explosives passed the tests for authorisation, and one was withdrawn after passing the preliminary test.

General Accidents

The total number of accidents reported to the inspectors during the year was 428, causing 37 deaths, and injuries to 437 persons. The total number of accidents is above that of last year, viz., 428 against 380. Although the total number of casualties is greater the number of deaths is less, viz., 37 against 52, while the number of injured is 437 against 373.

Of these, 60 accidents occurred in manufacture, causing 5 deaths and injuring 23 persons. The remainder occurred in use or in transport.

Formerly it was the practice to compare the numbers each year with the averages over the past ten years, but the high figures which obtained during the war would make this misleading, and it is better to compare the number of accidents, deaths and injuries with the averages for the years 1905 to 1914, which were: Accidents, 434·5; deaths, 56·1; persons injured, 433·9.

The majority of the factories on the books were inspected twice during 1923.

Where no special report was issued these accidents are

dealt with in detail, and contain many points of interest. In some cases the substances involved were what are generally classed as chemicals rather than explosives. These are dealt with towards the end of the report under the heading "Miscellaneous Accidents."

Accidents with Inflammable Chemicals

Among the accidents of this class there was one due to acetone. In this case a man was engaged in cutting open an empty steel drum at Esher Yard, Forest Gate, when an explosion occurred, and he and another man standing near were severely burned. It was found that the steel drum had contained acetone, and there is no doubt that an explosive mixture of acetone vapour and air was ignited by sparks from the cold chisel used in cutting the barrel.

Another serious accident was caused by the driver of lorry loaded with dissolved acetylene cylinders filling up his petrol tank by the aid of the light of an acetylene lamp. The petrol ignited and many of the cylinders were burst by the heat of the conflagration, with considerable damage to surrounding property. In another case oxygen leaked into an acetylene generator and became ignited through some unknown cause.

A fire which might well have had serious consequences occurred in connection with bisulphide of carbon. This liquid does not come under the operation of the Petroleum Acts, but owing to the low ignition point and the poisonous character of the vapour it gives off, it is considerably more dangerous than petroleum. It is, however, useless to bring it under the Petroleum Acts until powers are obtained to issue general regulations to govern conveyance by road since, owing to its high specific gravity and insolubility in water, it can be kept under water so that it is only during conveyance that danger arises. The circumstances were briefly as follows:—

On January 3 two ten-ton lorries loaded with drums of bisulphide of carbon were travelling from London to Manchester when some of the drums on the leading lorry were found to be on fire. This lorry was carrying thirty-five drums. Several of the drums burst and the fire spread; after nearly three hours it was extinguished. Some damage was done to the telegraph wires, and poisonous fumes were evolved. Examination of the second lorry showed that some of the drums were leaking, and any leakage on to the exhaust pipe would fully account for the fire. This consignment had just arrived from Germany and had been loaded straight off the ship into the lorries, in flimsy "non-returnable" drums.

The report concludes with a tabular statement of the accidents reported in 1923, showing the class or nature of the explosive, date, place, circumstances, and the casualties caused.

German Industry during April

THE Commercial Secretary at Berlin (Mr. J. W. F. Thelwall) has forwarded to the Department of Overseas Trade a review, based on the reports of the Prussian Chambers of Commerce, of the trade and industry of Germany during April, 1924, which states that the economic situation in April was characterised by an increasing scarcity of credit. Employment continued to improve, but production was affected by partial strikes. As in the preceding months, the German trade balance showed a deficit, viz., about 200 million gold marks, a sign that the improvement in trade is mainly due to the inland market. Before exports can be revived, it is necessary that the high protective duties of other countries should be reduced and that the organisation of factories should be steadily improved and no machinery allowed to run empty.

The business position in the potash industry was comparatively favourable. As, owing to the cold weather, the cultivation of the land was greatly delayed, large quantities of potash salts could still be despatched in April for spring fertilising. There were few foreign sales.

In the chemical industry the Halle Chamber of Commerce reported that sales became more difficult in the case of a number of products. Attempts were made to extend the strike which broke out in Ludwigshafen to Central Germany in order to stir up resistance to the increase in the hours of work. According to the report of the Gorlitz Chamber of Commerce an exceptional scarcity of money prevailed in the chemical preparations industry, and, in consequence, inland business was practically paralysed and undertakings were compelled to introduce considerable restrictions of work.

Artificial Preparation of Radio-active Water

AN interesting development of the "Sparklet" system of making carbonated water has recently been perfected by the same firm (Sparklets, Ltd., Upper Edmonton, London, N.18), in the form of a similar type of capsule containing a quill of radio-active salt. By this means it is possible with the aid of a "Sparklet" syphon to obtain a radio-active water, charged with radium emanation, which has curative properties similar to that found at Bath and some of the Continental spas. This result has only been obtained after considerable experiment. In 1912 the Sparklets Co. undertook researches in the Pyrenees with a well-known French scientist who discovered a very active source of radium emanations in the waters on his property. The rocks were tunnelled, and the radio-active gases collected and compressed into Sparklet bulbs, but owing to the fact that radium emanations disappear in less than four days when removed from their source, it was found impracticable to send these bulbs by post to patients. Many wonderful cures, however, were effected during the war by radium emanations in this scientist's sanatorium, both by the drinking of the waters and by exposure to the emanations.

Eventually the present plan was evolved, the radio-active bulbs, or tubes, containing a measured quantity of radium salt absorbed in the porous quills fitted inside the bulbs, or tubes, which retain their radio-activity permanently. Therefore, as long as the bulbs, or tubes, containing the compressed gas remain unpierced in the hands of the user, their radio-activity is fully maintained. When the bulb or tube, is pierced, and the gas with which it is charged is released into the syphon, the water in the syphon absorbs the emanations of radium which are liberated with the gas, thus producing a water of very high radio-active properties containing from 500 to 5,000 Mache units per litre, according to the strength of the "Spa-Radium" bulb, or tube, used.

Nitrate Producers' Association Renewed

THE Chilean Nitrate Committee announces the receipt of a statement from the Asociación de Productores de Salitre de Chile, Valparaiso, to the effect that the association has been renewed as from July 1 next for a period of six years. It has been unanimously agreed to fix the following prices per metric quintal from July 1 next to May 31, 1925:—July, 19s. 3d.; first half of August, 19s. 5d.; second half of August, 19s. 7d.; first half of September, 19s. 9d.; second half of September, 19s. 11d.; first half of October, 20s. 1d.; second half of October, 20s. 3d.; first half of November, 20s. 4½d.; second half of November, 20s. 6d.; first half of December, 20s. 7d.; second half of December, 20s. 8d.; January 1 to May 31, 20s. 9d. Sales at these prices will begin as from May 14.

Commenting on the above prices the fortnightly circular of Messrs. Aikman (London), Ltd., states that the average price for 1924-1925 is likely to work out not more than 1½d. per metric quintal lower than for 1923-1924, but as during the past year producers have been subject to a contribution of 4d. per sp. quintal (=8½d. per metric quintal) to the Pool, to which they will not be subject next year, the average price is likely to show producers a benefit of about 7d. per metric quintal, as compared with the average obtained this year.

A New Aid to Overseas Trade

THE first volume of *The Door to the World Markets*, which is an international year book in English, French, and Spanish, on the trading conditions and possibilities of world markets with particulars of the Trade Press published in each country of the globe, has just been issued. This is a book which is intended to meet a need which has been experienced by manufacturers or merchants endeavouring to develop their overseas trade. Here are gathered in one volume the selected names of those journals in each trade, locality and language which covers the ground overseas with the concentrated effectiveness of his own trade journals at home. This useful feature is amplified by valuable data concerning the British Empire, selected for their direct bearing upon the problems of overseas trade. There are to be three other volumes dealing with (2) Continental Europe, (3) the Americas, and (4) the Near and Far East. The work is published by World Markets, Ltd., St. Mary's Chambers, 161A–166, Strand, London, W.C.

The Incentive of Gain (III)

Is It the Basis of Commerce and Industry?—What Business Without Profits Would Mean—The Reward of Good Service

By Sir Ernest Benn

THERE is a very commonly-held idea that gain is the basis of commerce and industry. We are constantly being told that Society is founded upon acquisitiveness. Mr. Sidney Webb, the President of the Board of Trade, asserts that business is blackmail, and it is widely and dangerously suspected by people generally that the driving force in business is greed. We are offered a new gospel; we are told that we must "produce for use and not for profit!" Ideas of this kind, whether in violent or mild form, have permeated our minds to such an extent that we have almost reached a stage when the business man is ashamed of his profits. There has been developed in this country a public opinion which tolerates the most oppressive taxation known to history because it feels somehow that it is a right and proper thing to punish that success which is represented by profits. We have reached such a pitch that even in the most conservative of political meetings one may raise a laugh at the expense of the ten-thousand-a-year man! Now I want to suggest that it is high time we retraced our steps a little and went over the ground again and asked ourselves whether we are really sure we have analysed the make-up of business finally and sufficiently, or whether we may not unknowingly or unconsciously be doing ourselves an injustice by accepting superficial views which will not bear examination.

The question of motive or incentive is admittedly a very difficult one, but we cannot afford in these enlightened times to shirk difficulties, or to be put off with false answers, or to be satisfied with half-way views. If we ask ourselves what is our motive in connection with many of the things that we do day by day we shall begin to see how complicated the question really is. For instance, why do we eat? Is it to please the appetite, or is it to make bone, muscle and tissue? Why do we play a game? Is it to win, or is it to get the health and joy and satisfaction which come out of merely playing? Why do we go to bed? Is it to enjoy restful sleep, or are we always conscious of its real purpose—to make us feel the desire to renew the effort which we so willingly abandoned the night before? Why do we pay our debts? Is it because we do not like owing, or because the other man wants to be paid, or because we know that only by paying can we owe again? Similarly, why do we work? Is it to gain, or is it to give satisfaction to others, or to get satisfaction ourselves, or merely because there is nothing else to do?

Commerce Cannot Exist Without Profit

We need to give more thought and study to the complex of things, in order that thought and action may be based upon ideas that are fundamentally sound. There is the science which Professor Marshall has hinted at—the science of the second move. He tells us that the ultimate effects of an economic cause are often greater than, *and in the opposite direction to*, those effects which lie upon the surface and which are easily observable. A very simple illustration of this motive difficulty, this incentive difficulty, is to be found in the motor-car. What is it that pushes the car along? Is it the piston, or the gas, or the spark? A motor cannot function without a magneto, and commerce, as I shall show, cannot exist without profit.

Suppose we assume that a business is conducted without profit. It will be admitted that there must be either a profit, or an exact balance or a loss. Take the second case, that of the exact balance. The business man would be supplying some need of his fellows and getting from them just what he required to pay his way—no more and no less. He would be making no profit and his fellows could not have any grievance against him. They could not call him a profiteer, they could not accuse him of greed and they could not charge him with being obsessed with the idea of the incentive of gain. The most obvious results of such an arrangement as that would be that nobody else would be tempted into the business, that there would be no competition, that no others would strive to do the business better and to give greater satisfaction to the consumers. Inevitably, as a consequence, there must be a failure to find that continuous stream of new supply upon which the comfort of the consumer and the progress of humanity have so far relied.

Let us look at the other case, that of the business conducted at a loss—the incentive being use and not profit. That business can go on just so long as there is some fund out of which the losses can be met. As soon as that fund is exhausted the workers—the suppliers who are the basis of the business—get nothing for their pains and cease to work or supply.

That, however, is not the whole of the story. In either of the cases just cited there is a more serious trouble. The consumer is robbed of the only means open of expressing an opinion upon the service rendered to him. Profit may be thought to be the incentive of the producer or the supplier, but it has a more important function as a measure of the satisfaction given to the consumer. If a business man offers satisfaction to his fellows they will reward him with good profits, and, strange as it may seem, so full of complexity is this problem, that those good profits would probably be still greater if the prices to the consumer were less.

The Desire to Control

There is another incentive in connection with commerce and industry which I believe to be far more important, far more active, far more powerful than the incentive of gain. It is the incentive of power, the desire to control. A successful business man controls on the one hand those who work for him and, on the other hand, those whom he supplies—his customers. And this much misunderstood incentive of gain so far from being a drawback or a danger, is really the safeguard which keeps the successful business man in his proper place, always given a free market. If he does not give satisfaction to those who work for him the theory is that somebody else will. If, on the other hand, he fails to satisfy those for whom he works—his customers—it is positively certain that somebody else will take his place and do the business. This question of satisfactory service lies at the very root of the problem. Success in business is dependent upon service. Profits are the reward of good service and represent, as I suggested earlier, the measure of the satisfaction given to the consumer. The business man may be full to the brim with greed and grasp, but he is powerless to gain anything unless he can give satisfaction to others. The moment he becomes inefficient his position disappears.

This point brings out the essential difference between private and public enterprise. It is conceivable that a bureaucrat can be put into a position of control without any qualifications to hold it, and the customer has to suffer from the inadequate service that such an arrangement entails. But the business man in a free market can only hold his place as long as he can do the job as well as, or better than, somebody else.

Importance of a Free Market

I have spoken of a free market and here, of course, arises a very great difficulty. There is no doubt at all that the motive of greed, the incentive of gain and the desire to profiteer can be effective in a restricted market—such a market as develops in a time of war, or such a market as is to be found on all hands due to fiscal barriers, legislative restrictions, trade union limitations, and so on. It is an amusing reflection to those who think deeply on these matters that the politicians who talk most loudly about combines, rings and trusts, are generally those who, by the invention of restrictive arrangements of one sort or another, are themselves responsible for the conditions which promote the growth of these abuses.

It is quite impossible, in the course of a short article such as this, to deal with a question upon which some hundreds of volumes have been written and published, but if I have done no more than to raise a few doubts, to indicate in the roughest way the complexity of the whole matter, and to suggest that it is utterly and entirely wrong to take a single idea, such as the idea of gain, and look upon it as the beginning and end of the business problem, then I have achieved my purpose.

When the business man takes a more active part in the discussion of economic problems, public opinion on these matters will begin to take a new direction.

Alleged Disclosure of a Secret Process

Action by Castner-Kellner Alkali Co., Ltd., v. Hawkyard and Others

In the Court of Appeal, before the Master of the Rolls and Lords Justices Atkin and Sargant, Mr. H. Murphy, on behalf of the Castner-Kellner Alkali Co., Ltd., mentioned the company's appeal from an order of Mr. Justice Talbot in relation to the delivery by the plaintiffs of particulars of the statement of claim. The respondents were the Gas Light and Coke Co. and the Staveley Coal and Iron Co., Ltd.

The Castner-Kellner Co., Mr. Murphy stated, were large chemical manufacturers, and they had at their works a certain alkali-chlorine cell, for the manufacture of caustic soda and chlorine, of both of which substances they are very large manufacturers. They alleged by their statement of claim that the construction and arrangement of that cell and the composition of certain parts of it manufacturing secrets which they had always endeavoured to preserve, and which their employees were under an obligation not to disclose to anybody else. This action is brought, in the first place, against two ex-employees, who went into the employment of the defendant companies, and were immediately employed by them upon the erection of a cell in imitation, so far as those employees' memories would assist them, of the Castner-Kellner cell. That was the cause of action against the two ex-employees breach of their contract to preserve secrets; and the plaintiffs alleged that the two defendant companies, with knowledge of the fact that these were secrets which employees were bound not to disclose, induced them to supply them with the information which they did. It was admitted that one of these ex-employees, a man who was getting £4 10s. a week, received a sum of no less than £1,250 from the Staveley Coal and Iron Company for his work in the erection of a cell, and that he actually abstracted two insulators which formed an important part of the Castner-Kellner cell from the floor of that cell; the insulators were then copied for the purposes of the defendant companies. In those circumstances the defendant companies took out a summons for particulars of the construction and arrangement of the Castner-Kellner cell. That application was adjourned until after the defence, on an appeal to the Judge. Then the defendant companies put in their defence denying that there were any secrets in the cell, and alleging that all the information necessary to construct such a cell could be got from expired patents, and also setting up that in any event they acted innocently in employing these two men, and so far as the Gas Light and Coke Company were concerned, adding that so soon as they heard anything about the insulator incident they immediately dismissed the two men from their employment.

Particulars to be Given to Experts

When the summons for these particulars was restored, an order was made that the Castner-Kellner Co. should give these particulars, the complete specification of the cell, to certain named and independent experts, four in all, also the counsel for the defendant companies, not to anybody else. The exclusion of the solicitors was very unusual. The defendant companies appealed to the Judge against that order in so far as it excluded the solicitors for the defendant companies from the right to get those particulars, and the Judge made an order including the solicitors as amongst the parties to whom these particulars should be given. By the Judge's order, therefore, he was compelled to give these particulars to the solicitors who were conducting the defence of the two ex-employees who had never themselves been held entitled to the particulars.

Lord Justice Atkin: Is there any objection to disclosing these particulars to the one particular member of each eminent firm of solicitors who is in fact dealing with the matter; to disclose it to him on an undertaking not to impart the information to any other client or to anybody else?

Mr. Murphy: That would meet my clients' objection perfectly.

Lord Justice Atkin: Cannot that be arranged?

Mr. Andrewes Uthwatt: On behalf of my clients, the Gas Light and Coke Company, we have no objection to that at all.

Mr. Trevor Watson (for the Staveley Coal and Iron Co.): There is no objection whatever.

The Right of Gas Companies to Manufacture Chemicals

Issue taken to Court of Appeal

On Wednesday, the Court of Appeal, consisting of the Master of the Rolls and Lords Justices Warrington and Sargant, heard an appeal by J. L. Deuchar, secretary of the Castner-Kellner Alkali Co., from the refusal of Mr. Justice Astbury to make a declaration that the Gas Light and Coke Co. were acting *ultra vires* in manufacturing or erecting a factory for the purpose of manufacturing any chemical or other substance necessary for the treatment or conversion of any of the products arising from the making of gas.

The plaintiff's case was that the gas company produced naphthalene, and to convert that into betanaphthol had purchased chemicals from the Castner-Kellner and other companies. Recently they had conceived the idea of laying down expensive plant, on land acquired under the authority of an Act of Parliament, for the purpose of manufacturing caustic soda which by reason of the profits made on the gas undertaking might (the plaintiff feared) be sold even at a loss.

The defence advanced on behalf of the gas company was that they had not and were not manufacturing caustic soda for sale, but were only by electrolytic plant producing caustic soda (and as an incident chlorine) in such limited quantity as was necessary to treat their residual naphthalene Mr. Justice Astbury held that what the gas company were doing was not *ultra vires*.

Sir Douglas Hogg, K.C., for the appealing plaintiff, said it was conceded that the defendant company might make gas and residuals from gas or they might make articles produced from materials used in the manufacture of gas or might convert residuals. But that exhausted their powers. They could not start the business of making things which they used for the purpose of converting residuals. They could not start a colliery business because they used coal, and they could not make caustic soda to produce chlorine which was to be turned into bleaching powder. Nor could they sell that powder. The manufacture of caustic soda was not incidental to the powers vested in the company.

Sir John Simon, K.C., for the respondent defendants, argued that one of the gas company's businesses was that of converters of gas residuals. That was a principal object. Unless an extension of business transformed the business into something else it has never been held that such extensions, made *bona fide*, were outside the powers of the company. In this case it was the more clearly within the powers of the company because one of the company's main stated objects was to deal with residuals.

The hearing was resumed on Thursday.

Mr. Greene, K.C., following Sir John Simon, K.C., for the respondents, argued that all the gas company had done was done in pursuance of one of their statutory powers. If they had produced caustic soda for sale that might have made a difference, but their plant was only sufficient to give them the amount they required.

Sir Douglas Hogg, K.C., replying for the appellant, said that if the company were not producing caustic soda for sale they were selling as bleaching powder the chlorine they obtained in producing the caustic soda. There was nothing in the Gas Light and Coke Co.'s Act which by reasonable implication authorised what the defendants had done.

Their lordships reserved judgment.

Shellac Contract Appeal

On Tuesday, in the Court of Appeal, Lords Justices Banks, Scrutton and Atkin had before them the case of Dunlop Bros. and Co. *v.* E. D. Sassoon and Co., Ltd., which was an appeal by the plaintiffs from a judgment of Mr. Justice Bailhache. Plaintiffs carry on business at Fenchurch Street, and defendants at St. Helen's Place. In the court below plaintiffs claimed damages for alleged breach of a contract of December, 1923, for the sale by the defendants to plaintiffs of 100 chests of shellac, which, it was alleged, contained adulterated matter in excess of that allowed by the contract. Defendants said the questions in dispute were determined by an award made before the goods were tendered, and that as the plaintiffs accepted the goods on that basis the matter was *res judicatare*. It was also said that the contract was subject to the rules of the London Shellac Trade Association, and

therefore an award in favour of plaintiffs was a condition precedent to the maintenance of the action. Plaintiffs replied that there had been no submission to arbitration at all, and that the so-called award was no award at all. Justice Bailhache held that the action failed. After hearing counsel, the Court dismissed the appeal.

The Commercial Preparation of Urea

A Useful Fertiliser

The notes given below are based on an article by M. Lucien Maugé which appeared in "La Revue des Produits Chemiques" a short time ago.

In order to make use of ammonia in agriculture as a fertiliser it must be converted into a product which is readily handled, easily absorbed by plants, and containing a high percentage of nitrogen. Ammonium sulphate and nitrate have the disadvantage of requiring the use of large quantities of sulphuric or nitric acids. Urea, as a stable crystalline compound containing 47 per cent. of combined nitrogen, has many advantages, and is in fact actually produced in the soil when calcium cyanamide fertiliser is used.

Of all the methods of preparing urea, only two are commercially practicable. These are the manufacture from cyanamide, and from ammonium carbamate.

Preparation of Urea from Cyanamide

The cyanamide method presents a number of difficulties in operation, for sometimes in the conversion hard lumps of the calcium salt are formed, and sometimes secondary reactions occur. The Société des Produits Azotés in their process introduce the finely powdered cyanamide into strongly agitated acid to prevent the formation of lumps which prevent contact between the salt and the acid. In this way a solution is obtained from which the urea may be extracted. As an example, in 100 litres of water 12 kilos of concentrated sulphuric acid may be dissolved, then 15 kilos of calcium cyanamide are introduced slowly. When half this has been added 12 kilos of sulphuric acid are put in, and the remainder of the cyanamide is added slowly, about an hour being required. The temperature must be kept at 60° to 70° C. Phosphoric or carbonic acids are also suitable for this process.

The reaction may be considered to take place in two stages :—

$$CaCN_2 + H_2SO_4 = H_2CN_2 + CaSO_4$$

$$H_2CN_2 + H_2O = CO\begin{matrix}NH_2\\NH_2\end{matrix}$$

From the quantities given above, 6 kilos of urea should be obtained, after precipitating the excess acid with lime, filtering and evaporating.

If calcium cyanamide is added to concentrated nitric acid a violent series of secondary reactions occurs, but the Swiss Nitrum Aktiengesellschaft have found that the required reaction takes place quietly if equivalent quantities are added to a weakly acid solution of calcium nitrate. The North Western Cyanamide Co. have a process for obtaining urea by the action of calcium cyanamide and dilute sulphuric acid at a high pressure, and a temperature of 80° to 90° C., when a 95 per cent. yield is obtained.

The Ammonium Carbamate Process

Ammonium carbamate is partially converted into urea when it is heated in a sealed tube, according to the equation :—

$$CO\begin{matrix}NH_2\\ONH_4\end{matrix} \rightleftharpoons H_2O + CO\begin{matrix}NH_2\\NH_2\end{matrix}$$

The most suitable temperature is about 145° C., when the yield is 40 per cent. to 50 per cent. The process may be carried out continuously or discontinuously. First of all the ammonium carbamate is prepared by leading carbon dioxide into aqueous ammonia and collecting the crystalline plates which are deposited, or by leading carbon dioxide and liquid ammonia into a vessel cooled below the ordinary temperature and provided with scrapers and brushes for removing the crust which adheres to the sides. Then 200 kilos of the carbamate are introduced into an autoclave lined with lead. This is heated to 150° C. for two to four hours. The temperature is then lowered to 100°–65° and the ammonia, carbon dioxide and water vapour formed by the dissociation of the unchanged carbamate is let out by a cock. The urea is obtained in a very pure state, and requires no further treatment. The gases are also used again.

The alternative continuous process makes use of the fact that the decomposition products of carbamate, mixed with ammonium carbonate, and carbamate, urea and water are liquid and homogeneous, and do not become solid until below 80° C. By leading carbon dioxide and ammonia under pressure into a lead-lined autoclave and withdrawing the liquid formed at suitable intervals, urea may be obtained continuously. The gases are introduced in the proportion of one volume of CO_2 to two of NH_3. These combine in the presence of water vapour, forming ammonium carbamate, and decomposing again to urea in solution. Opening a tap allows the mixture of liquid and vapour to pass into a chamber at 60°, where the urea is deposited, the undissociated carbamate decomposes, and the ammonia and carbon dioxide gases are led away and absorbed.

Whatever method is employed for the preparation of urea, the finished product is suitable either for direct use as a fertiliser, or for making mixed fertilisers.

Affairs of Southey Gas Producers, Ltd.

Under the Companies (Consolidation) Act, 1908, a meeting of the creditors in the matter of the voluntary liquidation of the Southey Gas Producers, Ltd., 79, Lombard Street, E.C., was held on Tuesday in London. The liquidator, Mr. Chambers, stated that the company was formed in October, 1916, with a nominal capital of £30,000. The machine manufactured was used for generating a super-heated vapour from paraffin. The Commercial Cars, Ltd., had paid £5,000 in cash into the company. The liquidator had no accurate statement of affairs, but as far as he could make out the liabilities amounted to roughly £18,000. The only assets of the company were the goodwill and patents which he put down at £200. This amount he informed the creditors might of course in time realise considerably more from advertising, but at present the only man who was really interested in the patents had made him a tentative offer of £250.

Some of the patents of the company were dead but some had been kept alive as the receiver had paid for them. There were three directors of the company: Mr. H. T. B. Underdown, the Hon. W. Egerton, and Mr. G. H. Horton. They were entitled to draw £250 per annum, while the chairman, Mr. Underdown, was entitled to a further £100. No resolutions were passed and the matter therefore remains in the hands of the present liquidator.

Judgment Against a Guano Firm

On Friday, May 16, in the King's Bench Division, Mr. Justice Bailhache delivered his judgment in the action by Pattullo, Higgs and Co. against the Anglo-Continental Guano Works, Ltd., in regard to a claim by the plaintiffs for damages in regard to the sale of fertiliser known as granular nitrolim. The defendants denied any warranty or breach of contract. His Lordship found in favour of the plaintiffs and assessed the damages at £1,155.

Another Claim

Later the Anglo-Continental Guano Works, Ltd., claimed against Nitrogen Fertilisers, Ltd., from whom they had obtained the granular nitrolim, to be indemnified against the damages recovered against them by Pattullo, Higgs and Co., Ltd.

His Lordship gave judgment for the defendants, Nitrogen Fertilisers, Ltd., with costs. He said he thought something was wrong with the 120 tons as other nitrolim had been sold without complaint, because that particular delivery had been kept by the Anglo-Continental Co. for some length of time, and it was said to have deteriorated by keeping.

Tariff Change

France.—The import duties on glucose have been modified, the present rate being 20 francs and 40 francs per 100 kilogs under the "Minimum" and "General" Tariffs respectively.

Chemical Matters in Parliament

Gas Mantle Industry.

Mr. Alexander (House of Commons, May 14), in answer to a question by Mr. Hogge, said that he had received applications from firms engaged in the gas mantle trade asking for the appointment of a committee of inquiry under Part II. of the Safeguarding of Industries Act to investigate the new conditions which have arisen as a result of the establishment of German trade on a gold mark basis. He also said that he had now received the supplementary information which the applicants had been asked to give, and he hoped that he would be able to give a decision regarding the appointment of a committee at an early date.

Fuel Research Station, Greenwich

The Prime Minister (House of Commons, May 15) replying to a question by Mr. Palmer on the wages paid to employees engaged at the Greenwich Fuel Research Station, said that the practice of the Government was to pay rates of wages and observe hours not less favourable than those commonly recognised by employers and trade societies in the trade in the district where the work was being carried out. He added that the minimum rate of wages for unskilled labourers at H.M. Fuel Research Station in Greenwich was being increased to £2 7s. 2d. per week with effect from the first full pay week in February.

Dangerous Drugs Act

Mr. Henderson, Home Secretary (House of Commons, May 15) in a reply to Mr. Church, said that the Dangerous Drugs Act was passed in order to give effect to the International Opium Convention of 1912, and codeine was not one of the drugs included in that convention. He was advised that codeine was not generally regarded by medical opinion as a dangerous drug of addiction.

Vegetable Oils, Nigeria

Mr. J. Harris (House of Commons, May 19) asked the Secretary of State for the Colonies whether his attention had been drawn to a warning issued by the Governor of Nigeria as to the danger which confronts the West African vegetable oil industry by reason of the growing Dutch competition.

Mr. Thomas, in reply, stated that he was aware of this, and said that the question of the best means of improving and increasing the production of palm oil had been considered by a committee, the report of which he was considering.

Phosphates

Mr. Clayton (House of Commons, May 19) asked the Minister of Agriculture, in view of the fact that there was no guarantee that, under the Nauru Island Agreement, the present allotment of 42 per cent. of the output of Nauru/Ocean Island phosphates would be available for the United Kingdom at any time in the near future, what provision was being made against emergencies and dependence upon foreign sources for supplies of this essential product ?

Mr. Buxton : The two main sources of supply of phosphate rock at present available in this country are North Africa, including Tunis, Algeria and Morocco, and the United States of America. I cannot imagine any "emergency" which might shut off supplies from North Africa or the United States of America which would not render it equally impossible for supplies to be obtained from Nauru.

British Dyestuffs Corporation

Mr. Webb, President of the Board of Trade (House of Commons, May 20), in answer to questions by Mr. Black, stated that no reparation dyestuffs had been sold to the British Dyestuffs Corporation for re-working or disposal, with the exception of a certain quantity of indigo requisitioned under a special arrangement which was in operation for a short time between the Board of Trade, the principal consumers of indigo in the textile trades, and the corporation. The prices charged for reparation dyestuffs were fixed by the Board of Trade from time to time, with the help of an informal committee consisting of two representatives of the Colour Users' Association and two representatives of the British Dyestuffs Corporation, as being the Board's agents. The supplies of such dyestuffs were requisitioned by the Board after consultation with representatives of the British makers and of the consumers, and had been confined, so far as practicable, to products not competitive with British products. The amount paid to British Dyestuffs Corporation, Limited, in the year ended March 31, 1924, in respect of commission and all other charges was £40,070. This amount represents commission on sales during the year amounting to £343,600—and not on the value of dyestuffs received—together with certain expenses chargeable to the Board of Trade.

Safeguarding of Industries Act

Mr. Keens (House of Commons, May 20) asked the President of the Board of Trade the number of workpeople employed on carbon production in April, 1921, and April, 1924, respectively, at the factory in this country which produces arc-lamp carbons, and which was given the protection of 33⅓ per cent. tariff in the autumn of 1921, under the Key Industries Schedule of the Safeguarding of Industries Act.

Mr. Alexander : I regret that I cannot give details of an individual works, but I am informed that the number of persons employed in April of this year was approximately double that of April, 1921. The output of the factory includes, however, various types of carbons which are not covered by the Safeguarding of Industries Act.

Poison Gas Appliances

Mr. Walsh, Secretary of State for War (House of Commons, May 20), replying to Mr. Becker, said that his Department was fully aware that the development of gas appliances was engaging attention in various foreign countries, and that the question of the protection of the civil population in this country was receiving consideration.

Explosives

Mr. Walsh, Secretary of State for War (House of Commons, May 20), in a reply to Lieut.-Colonel Pownall, said that it would not be in the public interest to state the quantities of explosives at present being produced in this country, but added that the capacity of the Government factory at Waltham in 1913 was 60 tons of cordite, 300 lb. tetryl, and 5 tons of gunpowder per week.

Catalogues Received

FIRE EXTINGUISHERS in large and small sizes, fire escapes, hose pipes, ladders, and other details for the fighting of fires are described, illustrated and priced in a number of leaflets issued by HEATHMAN AND CO., Parsons Green, Fulham, London, S.W.8.

THE LATEST ADDITION to the series of revised catalogues of laboratory apparatus now being issued by A. GALLENKAMP AND CO., of 19 and 21, Sun Street, Finsbury Square, London, E.C.2, deals with physical apparatus. This volume in nearly 200 pages contains particulars of all the requisites for the equipment of a physical laboratory, and being nicely bound in stiff boards forms a useful work of reference for the laboratory shelf.

"AN UNIQUE TRIO" is the title of an artistically produced little brochure describing three productions of JAS. A. SHEPHERD AND CO., LTD., of Forth Works, Glasgow. These are (1) "Enameloid," a leadless protecting paint of great resistive power, (2) "Chemicoil," a waterproof dressing for treating canvas, and (3) "Bulldog" oil dressing for proofing tarpaulins and rendering them supple.

ALL users of steam power plant will be interested in the catalogues issued by LANCASTER AND TONGUE LTD., Pendleton, near Manchester. These describe and give the prices of such adjuncts as stream traps of various types, for pressures from 2 to 250 lb. per sq. in., piston throttle valves, piston rings, and packings of improved design and other items which are well worthy of investigation.

HEAT LOSSES from the boiler at the front end may be very considerable, but devices for prevention of this are often unsatisfactory. Chemical engineers should therefore be interested in the type of boiler front manufactured by SUTCLIFFE BROTHERS AND BRYCE, LTD., of Globe Works, Hyde, which has been so successful as to secure numerous repeat orders. These boiler fronts are described in an illustrated leaflet, which may be obtained by readers on application to the firm.

MONEL METAL, which is getting well known as a corrosion resisting alloy, is described in a beautifully printed brochure issued by G. AND J. WEIR, LTD., Cathcart, Glasgow. This contains useful particulars as to working the metal, its suitability or unsuitability for various conditions, etc., and in addition there are a number of illustrations of chemical plant carried out in the metal.

From Week to Week

MR. G. D. PARKES, B.A., B.Sc., a research student at Queen's College, Oxford, has been appointed tutor in natural science.

A GRACE has been by the Senate of Cambridge University for the appointment of a new University lecturer in Organic Chemistry.

MR. J. B. SPEAKMAN, M.Sc., has been appointed Lecturer in Textile Chemistry at Leeds University in place of Mr. E. A. Fisher.

THE BRITISH METAL CORPORATION, LTD., regret to announce the death, after a short illness, of Mr. R. W. Rucker, C.B.E., one of the joint managing directors.

PRESIDENT COOLIDGE has been undergoing treatment for a severe cold by inhalations of a mixture of air with chlorine, and claims to have been much relieved.

PROFESSOR SIR WILLIAM J. POPE, F.R.S., was elected a corresponding member of the Academy of Sciences of the Institut de France at the meeting on May 12.

A NEW PROCESS is stated to have been discovered, according to a *Times* correspondent, for making aluminium more resistant to corrosion, and at the same time allowing it to be coloured for decorative purposes.

THE WEDDING TOOK PLACE at St. Margaret's, Westminster, on Tuesday, of Miss Joyce Brunner, only daughter of Sir John Brunner, M.P., and Captain Worsley, younger son of Sir William Worsley.

CONSIDERABLE ACTIVITY is reported from Russia in organising and enlarging the chemical warfare service, which is intended to be a fourth fighting service, more effective than the Navy, Army or Air Service.

AT THE International Shipping Conference on Wednesday, May 14, it was stated that the present method of fumigation of ships with HCN was not popular with shipowners on account of the cost. In one case it is stated that £467 had been spent, and as a result only one rat was killed.

APPLICATIONS are invited by the Appointments Board, University Offices, Cambridge, for the chair of organic chemistry in the Indian Institute of Science, Bangalore. Particulars of the post may be obtained from the Secretary of the Board, to whom applications should be sent before June 30.

WE REGRET TO STATE that Mr. Bernard Laporte, chairman and governing director of B. Laporte, Ltd., died on Monday morning, May 19, after a short illness. Mr. Laporte took an active interest in the business up to the last and presided over a board meeting as recently as Thursday of last week.

THE JOINT MEETING of the London Section of the Society of Chemical Industry with the Institution of the Rubber Industry, arranged to be held on May 26, has been postponed until the autumn owing to the inability of Mr. Van Rossem, who was to read a paper, to be present on account of family illness.

THE EDWARD MEDAL has been awarded to James Frederick Porter, aged eighteen, employed by Jackson and Co., of Cheetham, Manchester, for bravery in connection with the saving of the life of a boy who had been overcome by tetralene fumes during bleaching operations at Smedley Bridge Dye Works.

AT A MEETING of the directors of Dorman, Long and Co., Ltd., at Middlesbrough, on Friday, May 16, Mr. Lawrence Ennis, general manager, was elected to a seat on the board of the company. Mr. Ennis has just returned from Australia where he has been in connection with the Sydney Bridge contract.

UNDER THE AUSPICES of the Birmingham Branch of the Junior Institution of Petroleum Technologists, a lecture was given at the University of Birmingham on Tuesday by Dr. W. Forbes Leslie, F.G.S., on the "Somerset Oil Shale Fields." Many members of the Society of Chemical Industry (Birmingham and Midland Section) were present.

THE NEW PAINT AND VARNISH CHEMISTRY SECTION of the American Chemical Society has now been formally inaugurated. Dr. H. A. Gardner presided at the first session, held recently at Washington. Among the subjects discussed were the wetting power of paint and varnish liquids, the physical testing of varnish, the microscopy of white pigments, etc., etc.

AT THE ANNUAL MEETING of the British Cotton and Wool Dyers' Association, in Manchester, on Wednesday, Mr. Hoegger, the chairman, in the course of his speech referred to their position with respect to the British dyestuffs industry, and in connection with the proposed Anglo-German agreement he said if it was to give us all the advantages claimed it was difficult to see why the I.G. wanted to enter into it.

THE COUNCIL OF BIRMINGHAM UNIVERSITY have decided to confer the honorary degree of LL.D. on July 5 next on Sir Henry Fowler, K.B.E., (chief mechanical engineer to the Midland Railway), Emeritus Professor Frankland, F.R.S. (formerly Professor of Chemistry in the University), and Dr. F. Gowland-Hopkins, F.R.S. (Sir William Dunn Professor of Biochemistry in the University of Cambridge, Huxley Lecturer for 1924).

TULLY GAS PLANTS, LTD., announce that consequent upon their amalgamation with Gas and Fuel Plants, Ltd., the company has gone into voluntary liquidation. The business will, in future, be carried on by Gas and Fuel Plants, Ltd., who own construction rights for plants for the production of smokeless fuel. The registered office of Gas and Fuel Plants, Ltd., is 40–3, Norfolk Street, Strand, London, W.C.2, the telegraphic address "Damper, Estrand, London," and the telephone numbers City 4047 and 4048.

MR. O. C. USHER, one of a party of prominent engineers who have just returned from a tour of the United States and Canada, investigating the latest development in power house design and the application of powdered fuel to boilers, states that the Americans are utilising their coal to much greater advantage than is done in this country. So far as boilers are concerned America has gone far ahead of England, and he considers the remodelling of our plants on modern lines to be a matter of national importance.

ON BEHALF OF THE Joint Dyers' Executive, the Secretary has forwarded to the employers an application for an advance in wages. In this it is urged that the base rate of all day workers be raised 10 per cent., and that the minimum rates for women eighteen years and over be advanced to twenty shillings a week. Where the cost of living wages are paid on a flat basis, the piecework rate, the workers propose, should be raised 10 per cent. and the cost of living wages increased by a similar amount in all sections to that provided for in the percentage advance to day workers.

EXPERIMENTAL ERRORS are a constant cause for watchfulness to the analytical chemist, and in volumetric work, particularly with dilute solutions, variations in the end-point are probably the most fruitful cause of inaccuracy. We regret that in an advertisement in last week's issue by Sofnol, Ltd., of Greenwich, referring to the use of that firm's indicators for titrating dilute solutions, the key-word "end-point" was omitted by a printer's error, and the basis of the argument thereby largely lost, which is, of course, that dilute solutions require carefully standardised indicators giving a reliable end-point.

AT AN INQUEST held on Robert Beck, an employee at Brett's Oil Works, Gateshead, who died as a result of an explosion at the works, on Thursday, May 8, it was stated that Beck was inspecting a number of empty oil drums in a warehouse when the explosion occurred. The drums were used for lubricating and mineral oil, but the one supposed to have caused the explosion had come in from a customer the previous day and might have contained petrol, the fumes of which, it is thought, were ignited by the torch the man was carrying. The jury returned a verdict of "Accidental Death," and recommended that other means than the use of naked lights should be adopted to examine the drums.

Swiss and German Dye Agreement

AN agreement between German and Swiss dye makers was concluded early this month. It is stated that since early April negotiations have been taking place between the Basle chemical industry, which produces 15 per cent. of the world's output of dyes, and the German dye group with a view to finding the basis for sales agreements in connection with the principal foreign markets. It is considered noteworthy that the occasion of these negotiations is the first on which the German and the Swiss dye manufacturers have sought to come to any arrangement since August, 1914.

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Abstracts of Complete Specifications

214,293. HALOGENATION OF HYDROCARBONS AND THEIR DERIVATIVES. H. T. Tizard, 2, Lauriston Road, Wimbledon, London, S.W.19, D. L. Chapman and R. Taylor, Jesus College, Oxford. Application date, December 14, 1922.

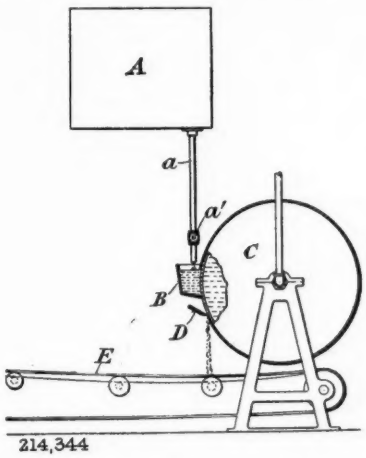
Hydrocarbons and other organic substances have been halogenated with the aid of copper chloride or ferric chloride as a catalyst, and halides such as phosphorus pentachloride, sulphuryl chloride, and antimony chloride, have been used as the source of the halogen. In the present invention the hydrocarbon is halogenated by contact with a metallic halide having a dissociation pressure of at least 0·01 atmospheres at temperatures about 500° C. As an example, methane may be passed over cupric chloride at a temperature below 500° C., e.g., 435° C., until the cupric chloride has been rendered inactive owing to removal of chlorine. The chloride may then be revivified by treating with chlorine, or a mixture of hydrogen chloride and air. The products are carbon tetrachloride, or a lower chloride, according to the temperature and rate of flow of the gas. In one example the products were CCl_4 16 per cent., $CHCl_3$ 15 per cent., CH_2Cl_2 12 per cent., CH_3Cl 5 per cent., and unconverted methane 52 per cent. The resulting cuprous chloride is rechlorinated by passing chlorine over it. The chlorine may be mixed with diluents such as hydrochloric acid, nitrogen, or carbon tetrachloride, or it may be cooled before entering the tube to avoid excessive liberation of heat. A system of heat interchangers may be used whereby the heat given out during rechlorination may be used to heat the cupric chloride during the passage of methane. It is necessary to exclude oxygen from the reaction, either free or combined as water vapour or copper oxide, since if oxygen is present phosgene is produced at the expense of the methane and chlorine. The yield of carbon tetrachloride which may be obtained by this process is about 70 per cent. of that theoretically possible from the methane consumed.

214,330. ACETYL CELLULOSE, TREATING IN ALKALINE LIQUIDS. The Clayton Aniline Co., Ltd., 505, Ashton New Road, Clayton, Manchester, and J. G. Grundy, 4, Henry Street, Bolton, Lancs. Application date, January 18, 1923.

Sulphide cellulose waste liquor or some of its constitutents such as sodium lignin sulphonate, cell pitch, and various sugars, have been added to dye baths for various purposes, and in the present invention these substances are used to protect acetyl cellulose from the attack of alkaline liquids, particularly when dyeing mixtures of acetyl cellulose silk and cotton with sulphur dyestuffs. In the absence of such an addition, mixed fabrics could not be dyed with fast colours in such a manner that only the cotton is dyed and the artificial silk remains white, since the alkaline liquids used hydrolyse the acetyl cellulose so that it becomes stained or dyed. It is found that the sulphite cellulose waste liquor retards or prevents this hydrolysis, so that the cotton is dyed to a normal tint while the artificial silk remains white. Examples are given of the application of this method in using pyrogene deep black A, pyrogene cutch 2GR, and pyrogene green 3G.

214,344. SOLIDIFYING MATERIALS THAT SOLIDIFY WITH A RISE IN TEMPERATURE, METHOD OF AND APPARATUS FOR. E. Cowles, 109, Myrtle Street, Boston, Mass., U.S.A., and The Electric Smelting and Aluminum Co., 555, West Jackson Street, Lockport, Niagara County, New York, U.S.A. Application date, January 23, 1923.

The apparatus is for causing the solidification of substances which during the process of manufacture change from a liquid or viscous condition to a crystalline condition with a rise of temperature. Such a material is the alumina-silica-alkali detergent which is described in Specification No. 200,175 (See THE CHEMICAL AGE, Vol. IX, p. 155). Solutions of this kind solidify when cool with an evolution of heat and rise of temperature due to the crystallising of the material, and this generation of heat during cooling prolongs the cooling, and may raise the temperature to such a point that the material melts and involves subsequent grinding. The liquid substance passes from a reservoir A through a pipe *a* and valve a^1 into a tank B, one side of which is formed by the cylindrical surface of a cooling drum C. The drum rotates slowly, so that it becomes coated with the liquid in a thin layer. The drum is cooled by circulating brine through it at a temperature of about 20° F. The drum rotates at about three revolutions per minute, and the film of material is cooled in its passage round to the scraper D. The cooled material is thus removed, and is deposited on a travellling conveyor E. The conveyor runs very slowly, and the material crystallises upon it and is discharged at the further end where the conveyor passes over a pulley.



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214,358. COMPOUNDS OF SULPHUR WITH ALKALI OR ALKALINE EARTH METALS, PRODUCTION OF. E. E. Naef, 9, Rue Cernuschi, Paris. Application date, January 31, 1923.

In this invention, alkali or alkaline earth metal hydrosulphides, thiosulphates or sulphides, or mixtures of these, are produced in a single operation by mixing an alkali or alkaline earth sulphate, sulphite, bisulphate, or thiosulphate, with sulphur or iron pyrites, liquid hydrocarbon oils or solid hydrocarbons, and with or without an alkali oxide, hydroxide, or carbonate, and heating the mixture. If a mixture of alkali sulphate, oil, and sulphur is heated to dull red heat in a closed vessel, the main product is alkali hydrosulphide, but in the course of the reaction sulphites and thiosulphates are formed at an intermediate stage. If the reaction is stopped at this stage by cooling the mixture, the alkali thiosulphate may be obtained by lixivivation and fractional crystallisation. The hydrocarbon oils effect the reduction of the sulphates at lower temperatures than usually employed. Alkali sulphites may be similarly reduced to alkali hydrosulphides, and the sulphur may be replaced by finely ground iron pyrites, or sulphides of copper or lead. Alkaline earth sulphates are reduced by this process at a dull red heat to the corresponding sulphides. Suitable hydrocarbons for use in the process are light and heavy tar oils, neutral wood tar, shale oil, mineral oils such as crude petroleum, and residues from the distillation of heavy hydrocarbons. The boiling point of these oils should be 200°—350° C. The alkali sulphate or other salt to be reduced may be mixed with alkali oxide, hydrate, carbonate, or alkaline earth oxide, hydroxide, or finely divided carbonate. An excess of sulphur is also added to transform these additional substances into their sulphides, hydro-sulphides, or polysulphides. Detailed examples are given of the production of alkali hydrosulphide from the sulphate, thiosulphate, and sulphite; alkali thiosulphate from sulphate; alkali sulphides from sulphate, sulphite, or thiosulphate; alkaline earth sulphides from sulphates; alkali hydrosulphides from alkali bisulphates or nitre cake.

214,477. RUBBER FROM RUBBER-LATEX, PROCESS FOR OBTAINING. J. Oltmans, 10, Bergweg, Hilversum, Holland. Application date, May 24, 1923.

The object is to recover practically the whole of the rubber from the latex, instead of the 25 per cent. usually obtained. In this process, the latex with or without preservative such as formalin and/or an anticoagulant such as ammonia, is mixed with one or more hydrocarbons, and further coagulation with

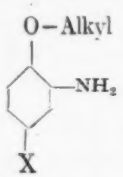
mineral acids may be applied. Suitable hydrocarbons are turpentine, turpentine oil and other terebenes, benzene, naphthalene, kerosene, mineral hydrocarbons and tar. After mixing, the coagulation may be effected by means of heat, smoke, concentration, mechanical means, or the addition of acids. The quantity of hydrocarbon necessary is about 10 per cent. of the latex. Reference is directed in pursuance of Section 7, Sub-section 4, of the Patents and Designs Acts, 1907 and 1919, to Specifications No. 116,326, 111,906 and 8487/1915.

214,483. TITANIC OXIDE FROM TITANIFEROUS IRON ORES, PROCESS FOR THE PRODUCTION OF. Chemische Werke vorm. Auerges. m.b.H. Kommanditges, Ehrenbergstrasse 11–14, Berlin, F. Sommer, Mommsenstrasse 47, Charlottenburg, Berlin, and J. d'Ans, Werftstrasse 2, Berlin. Application date, May 30, 1923.

Titaniferous iron ores are usually treated with sulphuric acid to obtain a solution from which titanium oxide is precipitated by hydrolysis under pressure at a temperature above 150° C., leaving a solution of ferrous sulphate. In this invention, the mother liquor containing 40 per cent. sulphuric acid is enriched with sulphur trioxide obtained by roasting the ferrous sulphate, and used for treating fresh quantities of ore. If the titaniferous solutions contain trivalent iron compounds these are reduced to divalent compounds by electrolytic methods, or by means of metallic iron, so that no foreign substances are introduced. The process may be modified by recovering part of the iron from the ore by treating with chlorine and hydrochloric acid, and in this case it may only be necessary to separate the ferrous sulphate from the sulphuric acid every second or third cycle.

214,516. CORINTH COLOURED TO BLACK AZO-DYESTUFFS, MANUFACTURE OF. A. G. Bloxam, London. From Chemische Fabrik Griesheim-Elektron, Frankfurt-on-Main, Germany. Application date, July 11, 1923.

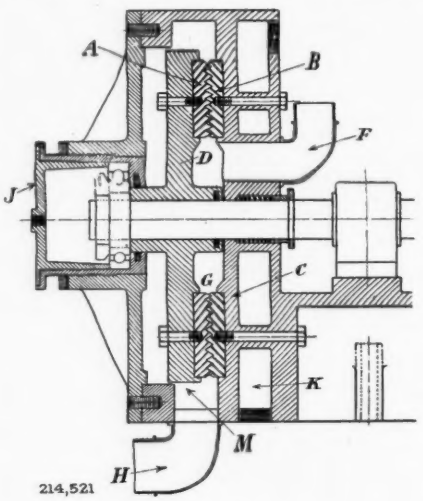
Specification No. 203,032 (See THE CHEMICAL AGE, Vol. IX., p. 376) describes the manufacture of black azo-dyestuffs by combining the diazo compound of an arylazo-1-naphthylamine body not containing a sulphonic group with an arylamide of 2 : 3-oxynaphthoic acid. In this invention, arylamides of 2 : 3-oxynaphthoic acid are combined with certain other amino-azo bodies not containing a sulphonic group, the amino-azo bodies being formed by combining diazo compounds not containing an auxochromic group with substances having the general formula :—



where X is a monovalent atom or group, such as halogen, alkyl-, acylamino-, alkyloxy group, etc. The amino-azo bodies used are obtained from non-sulphonated diazo compounds not containing an auxochromic group such as those obtained from aniline, its homologues and substitution products such as toluidines, xylidines, aminophenol alkyl ethers, aminocresol alkyl ethers, chloro- and nitranilines, chloro and nitroxylidines, chloro- and nitro-aminophenol alkyl ethers, chloro- and nitro-aminocresol alkyl ethers, α and β-naphthylamine, or their derivatives such as aminonaphthol ether aminomethyl naphthalene, chloro- or nitro-naphthylamines, etc. These are combined with an aminocresol alkyl ether, aminoacetyl aminophenol alkyl ether, or aminohydroquinone dialkyl ether, having the general formula above. The azo components used are any of the arylides of 2 : 3-oxynaphthoic acid such as the anilide, toluidides, anisidides, phenetitides, α and β-naphthalides, 2 : 3-oxynaphthoyl-aminothiazol, di-2 : 3-oxynaphthoyl-metatoluylene- and paraphenylene-diamine, arylides which are chloro- or nitro-substituted, etc. Examples of the preparation of these dyestuffs are given.

214,521. FILM MILLS FOR PERFECT EMULSIFICATION OF LIQUIDS AND SEMI-LIQUIDS AND FOR GRINDING SOLIDS SUCH AS COAL, PITCH, AND THE LIKE, BY MEANS OF DISPERSORS. J. Harrison Carter, Ltd., Dunstable, C. May, London Road, St. Albans, and L. Barradell, 137, Ratcliffe Road, Loughborough. Application date, July 26, 1923.

The substances are emulsified between a stationary ring B bolted to the body of the machine C, and a ring A attached to a disc D which rotates at 5,000 to 8,000 revolutions per minute. These rings are provided with a series of concentric teeth of triangular section, which mesh with one another as shown. The face of each ring is also provided with a number of grooves which are tangential to its inner circumference, and intersect the concentric teeth. The slots in the two rings are inclined in opposite directions. The material is fed through the inlet F and chamber G to the emulsifying rings, and is



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then discharged to the outlet H. A jacket K may be provided for heating or cooling the apparatus. The ring A is capable of adjustment axially so that its distance from the ring B varies from 0·0001 inch to a few hundredths of an inch. The material tends to travel outwards by centrifugal force, but is brought inwards again by the tangential grooves, until it is finally expelled by the material fed to the machine. The material is more finely ground in this apparatus than with apparatus having plain discs in contact.

214,544. FUEL GAS, PROCESS FOR THE MANUFACTURE OF. J. Y. Johnson, London. From Badische Anilin und Soda Fabrik, Ludwigshafen-on-Rhine, Germany. Application date, September 17, 1923.

Fuel gas, *e.g.*, blue water gas or mixed gas, is usually made from coke in coarse lumps which are subjected to the action of air and steam alternately. The present invention makes use of small sized coal, refuse coke, coke dust, lignite coke, etc., in the form of powder or small granules. The carbonaceous material is placed on a plate of perforated pipeclay at the bottom of a cylindrical shaft furnace or producer. Air is blown in from below at a gradually increasing pressure, until the particles of coke are given a movement having the appearance of boiling. By this means a free passage of gas is secured, and the combustion is rendered uniform through the whole mass while the ash is carried out of the furnace with the gases. The air is cut off when the temperature reaches about 1100° C., and steam is supplied at a similar pressure. The resulting blue water gas is composed approximately of carbon monoxide 43 per cent., hydrogen 45 per cent., carbon dioxide 2·5 per cent., and no methane.

NOTE.—Abstracts of the following specifications, which are now accepted, appeared in THE CHEMICAL AGE when they became open to inspection under the International Convention: 194,694 (G. Poma) relating to a process for the manufacture of *p*-aminophenol, see Vol. VIII., p. 548; 199,027 (C. Urfer) relating to a process for the preparation of powdered lithium nitride, see Vol IX., p. 180; 201,528 (Rhenania Verein Chemischer Fabriken Akt.-Ges.) relating to the production of salts of barium and strontium soluble in water from the residues of the manufacture of barium sulphide and strontium sulphide, see Vol. IX., p. 350.

International Specifications not yet Accepted

213,249. Treating Tar and Tar Oils. Rütgerswerke Akt.-Ges., 33, Lützowstrasse, Berlin. International Convention date, March 24, 1923.

Tar and tar oils are mixed with water-soluble salts of organic bases such as pyridine or its homologues, the primary, secondary or tertiary amines of the aromatic series, or the secondary or tertiary aliphatic or hydroaromatic bases. Suitable salts are sulphates, chlorides, nitrates, acetates and lactates. Two layers are formed, one containing the neutral oil and the other the salt and the phenol. If brown coal tar oil is mixed with pyridine sulphate and left to stand, the lower layer consists of pyridine-sulphate-cresol. This may be washed with the water used for washing the upper oil layer to obtain a water-free cresol.

213,250–1. Synthetic Perfumes. M. Naef and Co., 1, Chemin des Mélèzes, Queue d'Arve, Geneva. International Convention date, March 22, 1923.

213,250. To obtain nerolidol—*i.e.*, methyl-vinyl-homogeranyl-carbinol, dihydro-pseudo-ionone is condensed with acetylene, and the resulting methyl-ethinyl-homogeranyl-carbinol is reduced. The condensation with acetylene may be effected by sodium amide or powdered sodium in absolute ether, or sodium-acetylene may be used. The ether solution is treated with sodium and water to reduce the acetylene bond, or with sodium and alcohol, or with hydrogen in presence of finely divided nickel, platinum or palladium. Nerolidol may be treated with acetic anhydrides to obtain farnesol, and may be oxidised by chromic acid to obtain farnesal.

213,251. Nerolidol is treated with acetic acid or anhydride to obtain farnesol, a sesquiterpene alcohol. Alternatively, chromium trioxide may be used, yielding farnesal, which must then be reduced. In an example, nerolidol is heated with acetic anhydride to 120°–140° C. for 20 hours, the excess of acetic acid removed, and the product saponified with alcoholic potash. This product is heated with phthalic anhydride to obtain a phthalic ester, which is dissolved in alkali and extracted with ether to purify it. The product is reprecipitated by acid and saponified to obtain farnesol, which may be oxidised to yield farnesal which forms a semi carbazone. If nerolidol is treated with chromic acid to obtain farnesal, the latter may be reduced with alcohol and sodium amalgam.

213,252. Decolorising Carbon. J. Perten, 8, Komenského, Prague, Czecho-Slovakia. International Convention date, March 19, 1923.

Wood waste, charcoal, peat, cellulose, brewers' or distillers' grains, animal waste, or spent charcoal is impregnated with zinc chloride and potassium, calcium, strontium, magnesium, or manganese chloride, and then carbonised to obtain a decolorising charcoal.

Latest Notifications.

215,716. Continuous process and apparatus for the dehydration of organic liquids. Soc. Ricard, Allenet et Cie. May 9, 1923.

215,734. Method of producing metallic vanadium. Wittig, A. May 7, 1923.

215,737. Method of extracting vanadium. Wittig, A. May 7, 1923.

215,769. Manufacture of new azo dyestuffs. Farbenfabriken vorm. F. Bayer and Co. May 7, 1923.

215,776. Fuel for internal-combustion engines. Badische Anilin- und Soda-Fabrik. May 8, 1923.

215,782. Manufacture of vat dyestuffs. Farbwerke vorm. Meister, Lucius, and Brüning. May 9, 1923.

215,783. Process for dyeing acetate silk. Farbenfabriken vorm. F. Bayer and Co. May 9, 1923.

215,789. Process of making ammonia by catalysis. Brunner, Mond and Co., Ltd. May 12, 1923.

215,790. Process of concentrating sulphuric acid. Metal Traders Technical, Ltd. May 11, 1923.

Specifications Accepted with date of Application.

193,834. Azo dyestuffs, Manufacture of. Farbwerke vorm. Meister, Lucius, and Brüning. February 24, 1922.

198,346. Oil contained in agglomerated substances obtained by the churning of pulverised substances in a bath of water mixed with oil, Process of recovery of. Soc. de Recherches et de Perfectionnements Industriels and E. B. G. Bascou. May 29, 1922.

198,374. Sugar solutions, Process for purifying and decolorising. J. N. A. Sauer. May 26, 1922. Addition to 184,473.

200,789. Rubber, and the like, Process for the vulcanisation of. Naugatuck Chemical Co. July 13, 1922.

201,570. Caoutchouc, gutta-percha, and the like, Vulcanisation of. J. Chatelan. July 28, 1922.

202,652. Rubber articles, Process of manufacturing—to avoid vulcanisation as one of the steps. H. S. Wills. August 17, 1922.

203,310. Resins, Manufacture of. Soc. of Chemical Industry in Basle. September 1, 1922.

206,469. Phenols and formaldehyde, Manufacture of condensation products from. Bakelite Ges. and R. Hessen. November 4, 1922. Addition to 159,461.

206,487. Bismuth salts, Manufacture of emulsions of. F. Hoffmann–La Roche and Co., Akt.-Ges. November 1, 1922.

208,162. Disazo dyestuffs, Manufacture of. Durand and Huguenin Akt.-Ges. December 11, 1922.

209,379. Ammonia charged gas, Treatment of. Koppers Co. January 2, 1923.

210,382. Hydrogen sulphide and other noxious constituents, Process and apparatus for the removal of—from gases containing them. Koppers Co. January 24, 1923.

215,069. Gas, Apparatus for the manufacture of. W. J. Mellersh-Jackson. (*Western Gas Construction Co.*) January 30, 1923.

215,073. Distillation installations, solvent recovery plants, and similar installations for the recovery of liquids by heat treatment. F. A. Hughes and Co., Ltd. (*H. Schmidt.*) January 30, 1923.

215,095. Matter from the surface of a liquid, Removal of—particularly in working apparatus for heat treatment by means of molten metal. Thermal, Industrial, and Chemical (T.I.C.) Research Co., Ltd., and Sir A. M. Duckham. February 2, 1923.

215,098. Straining or filtering apparatus. F. C. Fulcher. February 3, 1923.

215,231. Alloys. British Thomson-Houston Co., Ltd. (*General Electric Co.*) August 1, 1923.

Applications for Patents

Allis-Chalmers Manufacturing Co. Pumps. 11,835. May 13. (United States, January 21.)

Brunner, Mond and Co., Ltd. Process of making ammonia by catalysis. 11,655. May 12. (United States, May 12, 1923.)

Chambrier, P. de. Process for recovery of crude oil. 12,132. May 16.

Clemm, H. Müller-, and Ges. für Chemische Produktion. Manufacture of decolorizing charcoal. 11,847. May 13. (Germany, May 14, 1923.)

Cross, C. F. Application of cellulose hydrates. 11,723. May 12.

Farbwerke vorm. Meister, Lucius, and Brüning. Manufacture of vat dyestuffs. 11,859. May 13. (Germany, June 25, 1923.)

Fulweiler, W. H., and Humphreys and Glasgow, Ltd. Quantitative determination of hydrogen sulphide in gas. 11,751. May 12.

Ges. für Chemische Produktion. Elimination of iron from water. 11,845. May 13. (Germany, May 14, 1923.)

Ges. für Chemische Produktion. Obtaining hydrochloric acid free from arsenic. 11,846. May 13. (Germany, May 14, 1923.)

Metal Traders Technical, Ltd. Process of concentrating sulphuric acid. 11,676. May 12. (Germany, May 11, 1923.)

Moore, Q. Process for purification of creosote oils, etc. 12,179. May 17.

Ropp Tin, Ltd. Gravity concentration of ores. 11,965. May 14.

Wilson and Son, Ltd., E., and Young, A. E. Drying, dyeing, vulcanizing, etc. 11,763. May 12. (July 11, 1923.)

Standard Specification for Leather Belting

It has long been felt desirable by large users of leather belting—the Admiralty, War Office, railway companies, and other large concerns—that there should be some standard specification on which tenders could be based. Recognising the need, the Federation of Leather Belting Manufacturers of the United Kingdom has now compiled a standard specification, a copy of which may be obtained on request from the Secretary, Mr. L. D. Kidson, 1, Booth Street, Manchester, or from any firm of belting manufacturers. In drawing up this specification, the Federation has realised that owing to the varying conditions of driving machinery by belting and the different requirements of users, it is impossible to lay down a hard and fast rule, and they emphasise the fact that the standard specification is to be regarded as "the minimum standard of quality that should be demanded by buyers and users who require a belt of reliable quality." A perusal of the specification indicates that the Federation has expended a great deal of thought on its compilation, and if the specification is rigidly regarded as the minimum it should do much to eliminate inferior leather belting.

Market Report and Current Prices

Our Market Report and Current Prices are exclusive to THE CHEMICAL AGE, *and, being independently prepared with absolute impartiality by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., may be accepted as authoritative. The prices given apply to fair quantities delivered ex wharf or works, except where otherwise stated. The current prices are given mainly as a guide to works managers, chemists, and chemical engineers; those interested in close variations in prices should study the market report.*

London, May 22, 1924.

THERE has been an improved inquiry for industrial chemicals during the past week, and the tendency generally is better, particularly in the North.

There is little change in values. Export demand has been quiet.

General Chemicals

ACETONE is very scarce for spot delivery, and stocks command a premium. The price to arrive is also stiffening.
ACID ACETIC is in very fair demand at recent values.
ACID CITRIC has advanced in price.
ACID FORMIC is scarce for spot delivery. The price for forward delivery is steady and seems to have touched bottom.
ACID LACTIC is unchanged.
ACID OXALIC is slow of sale.
BARIUM CHLORIDE is unchanged.
BLEACHING POWDER is unchanged.
COPPER SULPHATE is unchanged.
CREAM OF TARTAR is higher in price and scarce for delivery during the summer.
FORMALDEHYDE is a fair market, but the lower prices do not seem to have stimulated the demand to any extent.
LEAD ACETATE is inquired for and the price is firm.
METHLY ALCOHOL is a weak market owing to stock realisations.
POTASSIUM CARBONATE AND CAUSTIC is unchanged.
POTASSIUM PERMANGANATE is without special feature.
POTASSIUM PRUSSIATE is unchanged.
SODA ACETATE is in good demand; price tends upwards.
SODA BICHROMATE is in active request, and quite a substantial business is passing.
SODA HYPOSULPHITE is unchanged.
SODA NITRITE is in fair demand and price is well maintained.
SODA PRUSSIATE is unchanged.

Pharmaceutical Chemicals

ACETYL SALICYLIC ACID.—A continued steady demand is reported. Price unchanged.
ACID SALICYLIC steadier.
BROMIDES.—Business is slow, second-hand parcels being offered below makers' prices.
GUAIACOL is in buyers' favour.
METHYL SALICYLATE continues to be offered cheaply.
PHENACETIN is in good demand, with the price slightly easier.
SODA SALICYLATE is lower.
VANILLIN continues to be a firm market.

Coal Tar Intermediates

There has been a fair trade passing in this market during the last week; the prices in the main are without change.
ALPHA NAPHTHOL is of fair interest.
ALPHA NAPHTHYLAMINE is in moderate request.
ANILINE OIL AND SALT.—A fair business has been passing.
BENZIDINE BASE.—Home trade business has been maintained without change in value.
DIMETHYLANILINE is in moderate request.
"H" ACID maintains a steady home trade business.
NITRO BENZOL.—The price continues firm with a normal demand.
PARANITRANILINE is of some interest without change in value.
RESORCINE has been inquired for on home account and the price is steady.
XYLIDINE is quieter.

Coal Tar Products

The market in coal tar products is maintaining a fairly quiet tone, with little change from last week.
90% BENZOL is steady at 1s. 6d. to 1s. 7d. per gallon on rails.
PURE BENZOL is more or less inactive, and is worth about 1s. 11d. per gallon on rails.
CREOSOTE OIL is quoted from 7d. to 7¼d. per gallon, on rails in the north, while the price in London is in the region of 8½d. per gallon.
CRESYLIC ACID is quoted at 2s. per gallon on rails for the Pale quality 97/99%, while the Dark quality 95/97% is worth 1s. 9d. per gallon.
SOLVENT NAPHTHA is firm at 1s. 3d. per gallon on rails.
HEAVY NAPHTHA is worth from 1s. 2d. to 1s. 3d. per gallon on rails.
NAPHTHALENES are quietly steady at £6 to £6 10s. per ton for the low qualities, while 74 melting point is worth about £7 per ton, and 76/78 melting point £8 to £8 10s. per ton.
PITCH.—Owing to the warm weather the demand for prompt delivery has practically ceased. For next season's business manufacturers are quoting 65s. to 70s. per ton, f.o.b., but very few transactions have been reported so far.

Sulphate of Ammonia

SULPHATE OF AMMONIA is unchanged, and the demand remains satisfactory.

Conference on Science and Labour

THE programme of the Conference on Science and Labour, to be held at the British Empire Exhibition on May 30 and 31, has been published. The Conference, which has been arranged by the British Science Guild in co-operation with the National Joint Council of the Trades Union Congress and the Labour Party, will be opened by the Prime Minister. There are to be five sessions, the subjects of discussion being:—(1) The Place of Science in Government; (2) Scientific Research in Relation to Industry; (3) Co-operation of Science and Labour in Production; (4) Science and the Human Factor; (5) Science in Educational Organisation.

The Prime Minister will open the Conference.

Sir Richard Gregory will preside, and Mr. Sidney Webb, President of the Board of Trade, will open the discussion on Science in Government, and Sir Richard Glazebrook and Major Church, M.P., will speak. At the second session, Lord Askwith will preside, and the chief speakers will be Mr. Hugo Hirst, Sir Oliver Lodge, Sir Daniel Hall and Mr. A. P. M. Fleming. Mr. C. T. Cramp will preside at the discussion on Science and Production, and the speakers are Lord Ashfield, Sir Hugh Bell, Mr. Frank Varley, M.P., and Mr. W. Straker. The fourth meeting will deal with Health and Psychology. Miss Margaret Bondfield, M.P., will preside, and the speakers include Sir Arthur Newsholme, Dr. C. S. Myers, Dr. Cyril Burt and Miss May Smith. At the final session, Mr. Arthur Greenwood, M.P., will preside, and the discussion on Science in Educational Organisation will be opened by Mr. R. H. Tawney, who will be followed by Sir Thomas Holland and Dr. R. P. Scott. Copies of the programme and tickets of admission may be obtained by application to the Conference Secretary, 15, Gower Street, W.C.1.

The Physics of Textile Fibres

ONE of the sessions of the Empire Textile Conference, which will be held at the British Empire Exhibition, Wembley, during Whitsun week, will be devoted to a general discussion on "Physical and Physico-chemical Problems relating to Textile Fibres." This discussion is being arranged jointly by the Faraday Society and the Textile Institute, and it will be held on Wednesday, June 11, from 2.30 to 6.30 p.m., in Conference Hall No. 4. The introductory address will be given by Dr. W. Lawrence Balls, and the programme of 12 papers includes contributions from all the leading laboratories in Great Britain and Ireland engaged in textile research. Full particulars may be obtained from the secretary of the Faraday Society, 10, Essex Street, London, W.C.2, or from the secretary of the Textile Institute, St. Mary's Parsonage, Manchester.

Current Market Prices

General Chemicals

	Per	£	s.	d.		£	s.	d.
Acetic anhydride, 90–95%	lb.	0	1	4	to	0	1	5
Acetone oil	ton	80	0	0	to	85	0	0
Acetone, pure	ton	100	0	0	to	101	0	0
Acid, Acetic, glacial, 99–100%	ton	71	0	0	to	73	0	0
Acetic, 80% pure	ton	47	10	0	to	48	10	0
Acetic, 40% pure	ton	25	0	0	to	25	10	0
Arsenic, liquid, 2000 s.g.	ton	85	0	0	to	88	0	0
Boric, commercial	ton	48	0	0	to	52	0	0
Carbolic, cryst. 39–40%	lb.	0	0	7½	to	0	0	8
Citric	lb.	0	1	5½	to	0	1	6
Formic, 85%	ton	63	0	0	to	64	0	0
Hydrofluoric	lb.	0	0	7	to	0	0	8
Lactic, 50 vol.	ton	37	0	0	to	39	0	0
Lactic, 60 vol.	ton	43	0	0	to	45	0	0
Nitric, 80 Tw.	ton	23	0	0	to	25	0	0
Oxalic	lb.	0	0	5½	to	0	0	5½
Phosphoric, 1.5	ton	35	0	0	to	38	0	0
Pyrogallic, cryst.	lb.	0	5	9	to	0	6	0
Salicylic, technical	lb.	0	1	9½	to	0	2	0
Sulphuric, 92–93%	ton	6	0	0	to	7	0	0
Tannic, commercial	lb.	0	2	0	to	0	2	3
Tartaric	lb.	0	1	1½	to	0	1	2
Alum, lump	ton	12	10	0	to	13	0	0
Chrome	ton	23	0	0	to	24	0	0
Alumino ferric	ton	7	0	0	to	7	5	0
Aluminium, sulphate, 14–15%	ton	7	10	0	to	8	10	0
Sulphate, 17–18%	ton	8	10	0	to	9	10	0
Ammonia, anhydrous	lb.	0	1	6	to	0	1	8
.880	ton	32	0	0	to	34	0	0
.920	ton	22	0	0	to	24	0	0
Carbonate	ton	30	0	0	to	32	0	0
Chloride	ton	50	0	0	to	55	0	0
Muriate (galvanisers)	ton	32	0	0	to	33	0	0
Nitrate (pure)	ton	40	0	0	to	45	0	0
Phosphate	ton	63	0	0	to	65	0	0
Sulphocyanide, commercial 90%	lb.	0	1	5	to	0	1	6
Amyl acetate, technical	ton	280	0	0	to	300	0	0
Arsenic, white powdered	ton	63	0	0	to	65	0	0
Barium, carbonate, Witherite	ton	5	0	0	to	6	0	0
Carbonate, Precip.	ton	15	0	0	to	16	0	0
Chlorate	ton	65	0	0	to	70	0	0
Chloride	ton	14	0	0	to	14	10	0
Nitrate	ton	37	0	0	to	40	0	0
Sulphate, blanc fixe, dry	ton	20	10	0	to	21	0	0
Sulphate, blanc fixe, pulp	ton	10	5	0	to	10	10	0
Sulphocyanide, 95%	lb.	0	0	11	to	0	1	0
Bleaching powder, 35–37%	ton	10	0	0	to	10	10	0
Borax crystals, commercial	ton	25	0	0	to		—	
Calcium acetate, Brown	ton	13	0	0	to	14	0	0
Grey	ton	19	10	0	to	20	10	0
Carbide	ton	13	0	0	to	13	10	0
Chloride	ton	5	15	0	to	6	0	0
Carbon bisulphide	ton	35	0	0	to	40	0	0
Casein technical	ton	80	0	0	to	90	0	0
Cerium oxalate	lb.	0	3	0	to	0	3	6
Chromium acetate	lb.	0	1	1	to	0	1	3
Cobalt acetate	lb.	0	6	0	to	0	6	6
Oxide, black	lb.	0	9	6	to	0	10	0
Copper chloride	lb.	0	1	1	to	0	1	2
Sulphate	ton	24	0	0	to	24	10	0
Cream Tartar, 98–100%	ton	82	0	0	to	85	0	0
Epsom salts (*see* Magnesium sulphate)								
Formaldehyde, 40% vol.	ton	62	0	0	to	63	0	0
Formusol (Rongalite)	lb.	0	1	11	to	0	2	0
Glauber salts commercial	ton	4	0	0	to	4	10	0
Glycerin crude	ton	65	0	0	to	67	10	0
Hydrogen peroxide, 12 vols.	gal	0	1	10	to	0	2	0
Iron perchloride	ton	20	0	0	to	22	0	0
Sulphate (Copperas)	ton	3	10	0	to	4	0	0
Lead acetate, white	ton	49	10	0	to	50	0	0
Carbonate (White Lead)	ton	50	0	0	to	52	0	0
Nitrate	ton	44	10	0	to	45	0	0
Litharge	ton	50	0	0	to	51	0	0
Lithophone, 30%	ton	22	10	0	to	23	0	0
Magnesium chloride	ton	4	0	0	to	4	5	0
Carbonate, light	cwt.	2	10	0	to	2	15	0
Sulphate (Epsom salts commercial)	ton	5	15	0	to	6	0	0
Sulphate (Druggists')	ton	9	0	0	to	10	0	0
Manganese Borate, commercial	ton	65	0	0	to	75	0	0
Sulphate	ton	45	0	0	to	48	0	0
Methyl acetone	ton	82	0	0	to	85	0	0
Alcohol, 1% acetone	ton	81	0	0	to	82	0	0
Nickel sulphate, single salt	ton	37	0	0	to	38	0	0
Ammonium sulphate double salt	ton	37	0	0	to	38	0	0
Potash, Caustic	ton	32	0	0	to	33	0	0
Potassium bichromate	lb.	0	0	5¾	to		—	
Carbonate, 90%	ton	30	0	0	to	31	0	0
Chloride, 80%	ton	9	0	0	to	10	0	0
Chlorate	lb.	0	0	3½	to		—	
Metabisulphite, 50–52%	ton	63	0	0	to	65	0	0
Nitrate, refined	ton	38	0	0	to	40	0	0
Permanganate	lb.	0	0	8	to	0	0	8½
Prussiate, red	lb.	0	1	10	to	0	2	0
Prussiate, yellow	lb.	0	0	8½	to	0	0	9
Sulphate, 90%	ton	10	0	0	to	10	10	0
Salammoniac, firsts	cwt.	2	15	0	to		—	
Seconds	cwt.	2	17	6	to		—	
Sodium acetate	ton	25	0	0	to	25	10	0
Arsenate, 45%	ton	45	0	0	to	48	0	0
Bicarbonate	ton	10	10	0	to	11	0	0
Bichromate	lb.	0	0	4½	to		—	
Bisulphite, 60–62%	ton	20	0	0	to	22	0	0
Chlorate	lb.	0	0	2½	to	0	0	3
Caustic, 70%	ton	17	10	0	to	18	0	0
Caustic, 76%	ton	18	10	0	to	19	0	0
Hydrosulphite, powder	lb.	0	1	6	to	0	1	7
Hyposulphite, commercial	ton	10	0	0	to	10	10	0
Nitrite, 96–98%	ton	29	0	0	to	30	0	0
Phosphate, crystal	ton	15	10	0	to	16	0	0
Perborate	lb.	0	0	11	to	0	1	0
Prussiate	lb.	0	0	5½	to	0	0	6
Sulphide, crystals	ton	8	10	0	to	9	0	0
Sulphide, solid, 60–62%	ton	15	0	0	to	16	10	0
Sulphite, cryst.	ton	11	10	0	to	12	0	0
Strontium carbonate	ton	50	0	0	to	55	0	0
Nitrate	ton	50	0	0	to	55	0	0
Sulphate, white	ton	6	10	0	to	7	10	0
Sulphur chloride	ton	25	0	0	to	27	10	0
Flowers	ton	11	0	0	to	11	10	0
Roll	ton	9	15	0	to	10	10	0
Tartar emetic	lb.	0	1	0	to	0	1	1
Tin perchloride, 33%	lb.	0	1	4	to	0	1	5
Perchloride, solid	lb.	0	1	5	to	0	1	6
Protochloride (tin crystals)	lb.	0	1	8	to	0	1	10
Zinc chloride 102° Tw.	ton	20	0	0	to	21	0	0
Chloride, solid, 96–98%	ton	25	0	0	to	30	0	0
Oxide, 99%	ton	42	0	0	to	45	0	0
Dust, 90%	ton	50	0	0	to	55	0	0
Sulphate	ton	14	0	0	to	15	0	0

Pharmaceutical Chemicals

Acetyl salicylic acid	lb.	0	3	4	to	0	3	6
Acetanilid	lb.	0	2	4	to	0	2	6
Acid, Gallic, pure	lb.	0	3	0	to	0	3	3
Lactic, 1.21	lb.	0	2	9	to	0	3	0
Salicylic, B.P.	lb.	0	1	10	to	0	2	0
Tannic, leviss.	lb.	0	3	0	to	0	3	3
Amidol	lb.	0	8	6	to	0	9	0
Amidopyrin	lb.	0	13	6	to	0	14	0
Ammon ichthosulphonate	lb	0	1	10	to	0	2	0
Barbitone	lb.	0	15	6	to	0	16	0
Beta naphthol resublimed	lb.	0	3	6	to	0	4	0
Bromide of ammonia	lb.	0	0	11	to	0	1	0
Potash	lb.	0	0	8	to	0	0	8½
Soda	lb.	0	0	8½	to	0	0	9
Caffeine, pure	lb.	0	12	0	to	0	12	6
Calcium glycerophosphate	lb.	0	5	9	to	0	6	0
Lactate	lb.	0	1	6	to	0	1	9
Calomel	lb.	0	3	9	to	0	4	0
Chloral hydrate	lb.	0	3	10	to	0	4	0
Cocaine alkaloid	oz.	1	0	0	to	1	2	6
Hydrochloride	oz.	0	17	0	to	0	17	6
Corrosive sublimate	lb.	0	3	3	to	0	3	6
Eucalyptus oil, B.P. (70–75% eucalyptol)	lb.	0	2	0	to	0	2	2
B.P. (75–80% eucalyptol)	lb.	0	2	1	to	0	2	3
Guaiacol carbonate	lb.	0	12	0	to	0	12	6
Liquid	lb.	0	10	6	to	0	11	0
Pure crystals	lb.	0	11	0	to	0	11	6
Hexamine	lb.	0	3	9	to	0	4	0
Hydroquinone	lb.	0	4	6	to	0	5	0
Lanoline anhydrous	lb.	0	0	8	to	0	0	9
Lecithin ex ovo	lb.	1	5	0	to	1	7	6
Lithi carbonate	lb.	0	9	9	to	0	10	3
Methyl salicylate	lb.	0	2	6	to	0	2	9
Metol	lb.	0	11	6	to	0	13	6
Milk sugar	cwt.	3	17	6	to	4	5	0
Paraldehyde	lb.	0	1	5	to	0	1	7
Phenacetin	lb.	0	6	0	to	0	6	6
Phenazone	lb.	0	7	9	to	0	8	3
Phenolphthalein	lb.	0	7	3	to	0	7	6
Potassium sulpho guaiacolate	lb.	0	6	3	to	0	6	9
Quinine sulphate, B.P.	oz.	0	2	3	to		—	

	Per	£	s.	d.		£	s.	d.
Resorcin, medicinal	lb.	0	5	6	to	0	6	0
Salicylate of soda powder	lb.	0	2	4	to	0	2	6
Crystals	lb.	0	2	6	to	0	2	9
Salol	lb.	0	4	0	to	0	4	3
Soda Benzoate	lb.	0	2	9	to	0	3	0
Sulphonal	lb.	0	16	6	to	0	17	0
Terpene hydrate	lb.	0	1	9	to	0	2	0
Theobromine, pure	lb.	0	12	0	to	0	12	3
Soda salicylate	lb.	0	8	6	to	0	9	0
Vanillin	lb.	1	5	6	to	1	8	0

Coal Tar Intermediates, &c.

Alphanaphthol, crude	lb.	0	1	9	to	0	2	0
Refined	lb.	0	2	3	to	0	2	6
Alphanaphthylamine	lb.	0	1	6½	to	0	1	7
Aniline oil, drums extra	lb.	0	0	8½	to	0	0	8¾
Salts	lb.	0	0	9	to	0	0	9½
Anthracene, 40–50%	unit	0	0	8½	to	0	0	9
Benzaldehyde (free of chlorine)	lb.	0	2	9	to	0	3	0
Benzidine, base	lb.	0	4	4	to	0	4	7
Sulphate	lb.	0	3	4	to	0	3	7
Benzoic acid	lb.	0	2	0	to	0	2	3
Benzyl chloride, technical	lb.	0	2	0	to	0	2	3
Betanaphthol	lb.	0	1	1	to	0	1	2
Betanaphthylamine, technical	lb.	0	4	0	to	0	4	3
Crocoine Acid, 100% basis	lb.	0	3	3	to	0	3	6
Dichlorbenzol	lb.	0	0	9	to	0	0	10
Diethylaniline	lb.	0	4	6	to	0	4	9
Dinitrobenzol	lb.	0	1	1	to	0	1	2
Dinitrochlorbenzol	lb.	0	0	10	to	0	0	11
Dinitronaphthalene	lb.	0	1	4	to	0	1	5
Dinitrotoluol	lb.	0	1	3	to	0	1	4
Dinitrophenol	lb.	0	1	6	to	0	1	7
Dimethylaniline	lb.	0	2	8	to	0	2	10
Diphenylamine	lb.	0	3	0	to	0	3	3
H-Acid	lb.	0	4	3	to	0	4	6
Metaphenylenediamine	lb.	0	4	0	to	0	4	3
Monochlorbenzol	lb.	0	0	10	to	0	1	0
Metanilic Acid	lb.	0	5	9	to	0	6	0
Metatoluylenediamine	lb.	0	4	0	to	0	4	3
Monosulphonic Acid (2.7)	lb.	0	8	6	to	0	9	6
Naphthionic acid, crude	lb.	0	2	4	to	0	2	6
Naphthionate of Soda	lb.	0	2	4	to	0	2	6
Naphthylamine-di-sulphonic-acid	lb.	0	4	0	to	0	4	3
Neville Winther Acid	lb.	0	7	3	to	0	7	9
Nitrobenzol	lb.	0	0	7	to	0	0	8
Nitronaphthalene	lb.	0	0	11½	to	0	1	0
Nitrotoluol	lb.	0	0	8	to	0	0	9
Orthoamidophenol base	lb.	0	12	0	to	0	12	6
Orthodichlorbenzol	lb.	0	1	0	to	0	1	1
Orthotoluidine	lb.	0	0	10	to	0	0	11
Orthonitrotoluol	lb.	0	0	3	to	0	0	4
Para-amidophenol, base	lb.	0	8	6	to	0	9	0
Hydrochlor	lb.	0	7	6	to	0	8	0
Paradichlorbenzol	lb.	0	0	9	to	0	0	10
Paranitraniline	lb.	0	2	6	to	0	2	8
Paranitrophenol	lb.	0	2	3	to	0	2	6
Paranitrotoluol	lb.	0	2	9	to	0	3	0
Paraphenylenediamine, distilled	lb.	0	12	0	to	0	12	6
Paratoluidine	lb.	0	5	6	to	0	5	9
Phthalic anhydride	lb.	0	2	6	to	0	2	9
Resorcin, technical	lb.	0	4	0	to	0	4	3
Sulphanilic acid, crude	lb.	0	0	9	to	0	0	10
Tolidine, base	lb.	0	7	3	to	0	7	9
Mixture	lb.	0	2	6	to	0	2	9

Essential Oils and Synthetics

Essential Oils.		£	s.	d.
Anise	c.i.f. 2/5, spot	0	2	6
Bay		0	10	6
Bergamot		0	18	0
Cajuput		0	3	3
Camphor, white	per cwt.	3	10	0
Brown	„	3	10	0
Cassia	easier, c.i.f. 7/1, spot	0	7	9
Cedarwood		0	1	9
Citronella (Ceylon)	c.i.f. 3/5, spot	0	3	7
(Java)	very firm, c.i.f. 5/-, spot	0	5	2
Clove		0	7	6
Eucalyptus		0	2	1
Geranium Bourbon		1	15	0
Lavender		1	10	0
Lavender Spike		0	5	6
Lemon		0	3	6
Lemongrass	per oz.	0	0	2¼
Lime (distilled)		0	5	0
Orange sweet (Sicilian)		0	13	0
(West Indian)		0	10	0
Palmarosa		0	18	0
Peppermint (American)		1	1	0
Mint (dementholised Japanese)	firmer	0	16	6
Patchouli		1	2	6
Otto of Rose	per oz.	1	15	0
Rosemary		0	1	9
Sandalwood		1	5	0
Sassafras		0	9	6
Thyme	4/6 to	0	5	6

Synthetics.		£	s.	d.
Benzyl acetate	per lb.	0	3	6
Benzoate	„	0	3	6
Citral	„	0	10	0
Coumarine	„	1	0	0
Heliotropine	„	0	8	0
Ionone	„	1	5	0
Linalyl acetate	„	1	12	6
Methyl salicylate	„	0	2	6
Musk xylol	„	1	0	0
Terpeniol	easier „	0	2	6

Chemical Deposits in Western Canada

A COMPARATIVELY new industry has contributed to Canada's mineral production within the past few years as the deposits of magnesium sulphate (Epsom salts) have been proved and production started on a commercial scale. The alkali deposits which occur in numerous localities in the prairie provinces contain appreciable percentages of magnesium sulphate, and it is possible that from these occurrences commercial magnesium sulphate will soon be recovered as a by-product in the production of sodium sulphate. In addition to these deposits there are three known deposits in British Columbia, one of which is being operated at the present time.

In the vicinity of Meadow Lake, 50 miles north of Clinton, British Columbia, the Lillooet Soda Company is operating at a hydrous sodium carbonate lake and shipping the product to Vancouver. This material is being disposed of at the present time to soap manufacturers on the Pacific coast, but plans are in hand for the erection of a drying plant to handle the material at the lake and to further increase the output. This company also owns several other lakes of the same material which they propose to operate at some future date.

Nitrogen Compounds and Detonation

NITROGEN in some of its compounds exerts a greater influence upon the character of combustion than any other element of small atomic number. The action of nitrogen is influenced in a large way by the elements or radicals attached to it. Thus, in some of its compounds it is quite effective for suppressing detonation in internal combustion engines, in some it is almost neutral, and in some it exerts the remarkable effect of inducing detonation. In a paper recently presented before the Petroleum Division of American Chemical Society, Mr. T. A. Boyd shows that detonation is suppressed by aniline, it is affected very little by pyridine, and it is induced or increased by propyl nitrite. In general, the nitrogen compounds which are most effective for suppressing detonation are the primary and the secondary amines. Of these the aryl amines, or those that contain at least one aryl group, have much the larger influence for eliminating detonation from internal combustion engines.

A New Sulphanthrene Dye

THE development of a new dye known as Sulphanthrene Blue GR Paste has been announced by E. I. du Pont de Nemours and Co. The new colour, which is new not only to the market of the United States but also for the world, is stated to be among cotton blues next in importance to indigo and the so-called Ponsol Blues. Before the war when the dyes which were known as Hydron Blue G and R were available a combination of the two colours was used in order to secure the shade which the trade wanted. The new colour by itself now gives the desired shade, and is stated to have better solubility and to give a clearer shade than the products formerly imported. In fastness to light and chlorine Sulphanthrene Blue is even superior to indigo, while under most severe washing tests it does not change whereas Sulphur Blue becomes red and dull, particularly under artificial light, and indigo becomes lighter and greener.

Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to THE CHEMICAL AGE *by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing the firm's independent and impartial opinions.*

Glasgow, May 22, 1924.

BUSINESS has been fairly quiet in the heavy chemical market during the past week, and there is nothing of importance to record.

Prices both for continental and home products are on about the same level as a week ago.

Industrial Chemicals

ACID ACETIC.—Prices remain unchanged; glacial, 98/100% now quoted £61 to £69 per ton; 80% pure, £49 to £51 per ton; 80% technical, £46 to £48 per ton. All packed in casks, delivered c.i.f. U.K. port, duty free.

ACID BORACIC.—Crystals or granulated, £48 per ton; powdered, £50 per ton, carriage paid U.K. stations, minimum ton lots.

ACID CARBOLIC, ICE CRYSTALS.—Little inquiry. Now offered at 7¾d. to 8d. per lb., carriage paid or f.o.b. U.K. port.

ACID CITRIC, B.P. CRYSTALS.—Unchanged at about 1s. 6¼d. per lb., less 5%, ex store, spot delivery. Offered for early delivery at 1s. 5¾d. per lb., less 5%, ex wharf.

ACID FORMIC, 85%.—Unchanged at about £63 per ton, ex store, spot delivery. Offered for early delivery at about £61 5s. per ton, c.i.f. U.K. port.

ACID HYDROCHLORIC.—In little demand. Price 6s. 6d. per carboy, ex works.

ACID NITRIC, 80°.—£23 10s. per ton, ex station, full truck loads.

ACID OXALIC.—Cheaper continental offers. Now quoted about 4¼d. per lb., c.i.f. U.K. port. Spot material available at about 5d. per lb., ex store.

ACID SULPHURIC.—144°, £3 12s. 6d. per ton; 168°, £7 per ton, ex works, full truck loads. Dearsenicated quality 20s. per ton more.

ACID TARTARIC, B.P. CRYSTALS.—Good inquiry. Quoted 1s. 2d. per lb., less 5%, ex store. Offered for early delivery at about 1d. per lb., less.

ALUMINA SULPHATE, 17/18% IRON FREE.—Spot lots quoted £8 per ton, ex store. Offered for early delivery at about £7 5s. per ton, c.i.f. U.K. port.

ALUM CHROME.—Ammonium chrome alum quoted £19 to £21 per ton, according to quality, f.o.b. U.K. port. Potash chrome alum about £26 per ton, ex store or station.

ALUM POTASH (LUMP).—Quoted £10 15s. per ton, ex store, spot delivery. Offered from the Continent at about £9 7s. 6d. per ton, c.i.f. U.K. port. Crystal quality 10s. per ton less.

AMMONIA ANHYDROUS.—Unchanged at about 1s. 5½d. per lb., ex station, prompt delivery.

AMMONIA CARBONATE.—Lump, £37 per ton; powdered, £39 per ton, packed in 5 cwt., casks delivered U.K.

AMMONIA LIQUID, 880°.—Unchanged at 2½d. to 3d. per lb., delivered, according to quantity. Containers extra.

AMMONIA MURIATE.—Grey galvanizers quality quoted £30 per ton, ex station. Fine white crystals offered from the Continent at about £26 5s. per ton, c.i.f. U.K. port.

AMMONIA SULPHATE.—25¼%, £13 12s. per ton; 25¾%, neutral quality, £14 15s. per ton, ex works, prompt delivery.

ARSENIC, WHITE POWDERED.—Moderate inquiry for export. Quoted £55 10s. per ton, f.o.b. U.K. port. Spot lots for home consumption on offer at about £59 10s. per ton, ex store.

BARIUM CHLORIDE, 98/100%.—English material quoted £14 to £14 5s. per ton, ex store. Offered from the Continent at about £13 7s. 6d. per ton, c.i.f. U.K. port.

BARYTES.—Finest English white quoted £5 5s. per ton, ex works. Continental about £5 per ton, c.i.f. U.K. port.

BLEACHING POWDER.—Spot lots £11 per ton, ex station. Contracts £20 per ton less.

BORAX.—Granulated, £24 10s. per ton; crystal, £25 per ton; powdered, £26 per ton, carriage paid U.K. stations, minimum ton lots.

CALCIUM CHLORIDE.—English material unchanged at £5 12s. 6d per ton, ex station. Continental advanced to about £5 5s. per ton, c.i.f. U.K. port.

COPPERAS GREEN.—Unchanged at about £2 5s. per ton, f.o.b. U.K. port in bulk. Quoted £3 5s. to £3 10s. per ton, in casks.

COPPER SULPHATE.—Offered for export at about £24 per ton, f.o.b. U.K. port. Continental material quoted £25 per ton, ex store.

FORMALDEHYDE, 40%.—Moderate inquiry and price unchanged at about £63 per ton, ex store, spot delivery.

GLAUBER SALTS.—English material unchanged at £4 per ton, ex store or station. Continental advanced to about £3 10s. per ton, c.i.f. U.K. port.

LEAD, RED.—Cheaper offers of Continental material. Now quoted £37 10s. to £38 per ton, ex wharf, early delivery.

LEAD, WHITE.—Spot material on offer at about £42 per ton, ex store.

LEAD ACETATE.—White crystals offered at £48 per ton, ex store; brown about 20s. per ton less; brown crystals offered from the Continent at about £45 5s. per ton, c.i.f. U.K. port.

MAGNESITE, CALCINED.—English ground material offered at £8 per ton, ex station. Moderate inquiry for export.

MAGNESIUM CHLORIDE.—Quoted £4 per ton, ex store, spot delivery. Offered from the Continent at about £3 7s. 6d. per ton, c.i.f. U.K. port.

MAGNESIUM SULPHATE (EPSOM SALTS).—English material, commercial quality, on offer at about £5 per ton, ex store. B.P. quality quoted £6 5s. per ton, ex station. Commercial quality offered from the Continent at about £3 12s. 6d. per ton, c.i.f. U.K. port.

POTASH CAUSTIC, 88/92%.—Spot lots on offer at £31 10s. per ton, ex store. Offered from the Continent at about £30 per ton, ex wharf.

POTASSIUM BICHROMATE.—Unchanged at 5¾d. per lb., delivered.

POTASSIUM CARBONATE.—96/98%. Moderate inquiry. Spot lots quoted £26 10s. per ton, ex store. Offered from the Continent at about £24 15s. per ton, c.i.f. U.K. port.

POTASSIUM CHLORATE.—Spot lots available at 3¼d. per lb., ex store, in little demand.

POTASSIUM NITRATE (SALTPETRE).—Quoted £27 10s. per ton, c.i.f. U.K. port, prompt shipment. Spot lots unchanged at about £30 10s. per ton, ex store.

POTASSIUM PERMANGANATE B.P. CRYSTALS.—Spot lots available at about 8¾d. per lb., ex store. Offered for early delivery at 8¼d. to 8½d. per lb., ex station.

POTASSIUM PRUSSIATE (YELLOW).—Unchanged at about 8½d. per lb., f.o.b. U.K. port. Continental on offer at about 8¾d. per lb., c.i.f. U.K. port.

SODA CAUSTIC.—76/77%, £19 7s. 6d. per ton; 70/72%, £17 17s. 6d. per ton; 60/62%, broken, £19 2s. 6d. per ton; 98/99%, powdered, £22 15s. per ton. All ex-station spot delivery. Contracts, 20s. per ton less.

SODIUM ACETATE.—In little demand. Quoted £25 7s. 6d. per ton, ex store. Offered from the Continent at about £23 15s. per ton, c.i.f. U.K. port.

SODIUM BICARBONATE.—Refined recrystallised quality, £10 10s. per ton, ex quay or station. M.W. quality, 30s. per ton less.

SODIUM BICHROMATE.—English makers' prices unchanged at 4½d. per lb., D/d.

SODIUM CARBONATE.—Soda crystals, £5 to £5 5s. per ton, ex quay or station. Alkali, 58%, £8 12s. 3d. per ton, ex quay or station.

SODIUM HYPOSULPHITE.—English material quoted £10 per ton, ex station. Continental on offer at slightly less. Pea crystals of English manufacture quoted £13 15s. per ton, ex station.

SODIUM NITRATE.—Refined, 96/98% quality now quoted £13 17s. 6d. per ton f.o.r. or f.o.b. U.K. port.

SODIUM NITRITE, 100%.—Moderate inquiry. Price about £28 per ton, f.o.b. U.K. port.

SODIUM PRUSSIATE (YELLOW).—English material quoted 4½d. per lb., f.o.b. U.K. port. Continental offered at slightly less, c.i.f. U.K. port.

SODIUM SULPHATE (SALTCAKE).—Price for home consumption, £3 10s. per ton, carriage paid, buyers' stations. Quoted 65s. per ton, f.o.b. U.K. port for export.

SODIUM SULPHIDE.—60/65% solid, English make, £14 15s. per ton, ex station; broken, £1 per ton more; flake, £2 per ton more; 60/62% solid, offered from the Continent at £12 10s. per ton, c.i.f. U.K. port; broken £1 per ton more; 31/34% Crystals, English make, £9 2s. 6d. per ton, ex station; 30/32% crystals, Continental make, £8 12s. 6d. per ton, c.i.f. U.K. port.

SULPHUR.—Flowers, £10 per ton; roll, £9 per ton; rock, £9 per ton; ground, £8 per ton. Prices nominal.

ZINC CHLORIDE, 98/100%.—Quoted £26 10s. per ton, f.o.b. U.K. port.

ZINC SULPHATE.—English material about £13 10s. per ton, ex store. Offered from the Continent at £11 7s. 6d. per ton, c.i.f. U.K. port.

NOTE.—The above prices are for bulk business, and are not to be taken as applicable to small parcels.

ALPHA NAPHTHYLAMINE.—Good export demand. Price, 1s. 4½d. lb., f.o.b.

BETA NAPHTHYLAMINE.—Some export inquiry. Price, 4s. lb., f.o.b.

BETA NAPHTHOL.—Foreign inquiry. Price 1s. 1d. per lb., f.o.b.

DIANISIDINE BASE.—Some export inquiry. Price 22s. 6d. lb., 100% basis, f.o.b.

DI CHLORANILINE.—Export inquiry. Price, 4s. 2d. lb., f.o.b.

META PHENYLENEDIAMINE. — Export inquiry. Price, 4s. 6d. lb.

META TOLUYLENEDIAMINE.—Export inquiry. Price, 4s. 6d. lb., f.o.b.

NAPHTHIONATE OF SODA.—Some home inquiry. Price, 2s. 5d. lb., 100% basis, delivered.

ORTHO NITROTOLUOL.—Some export inquiry. Price, 5d. lb., drums included, f.o.b.

PARA NITRO ACETANILIDE.—Small home inquiry. Price, 3s. 6d. per lb.

PARA TOLUIDINE.—Export inquiry. Price, 4s. 2d. lb., f.o.b,

PARA NITROTOLUOL.—Some export inquiry. Price, 2s. 1d. lb., f.o.b.

S S ACID.—Export inquiry. Price, 14s. lb., 100% basis.

SCHAEFFER SALT.—Home inquiry. Price, 3s. 6d. lb., 100% basis, carriage paid.

TOBIAS ACID.—Steady demand. Price, 5s. 2d. lb., 100% basis, carriage paid.

Chemical Trade Inquiries

The following inquires, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

CHINA CLAY AND TEXTILE MACHINERY.—A firm of agents, established at Strassburg, is desirous of obtaining the representation of British firms, on a commission basis, for the sale in France of textile machinery, yarns, china clay and other raw materials used in the textile industries. (Reference No. 596.)

CHEMICALS FOR FINLAND.—A firm of commission agents in Helsingfors desires to secure the representation for Finland of British exporters of chemicals, such as borax, formaldehyde, glycerine, soda ash, carbolic acid, caustic soda, copper sulphate, gum arabic and resin. (Reference No. 589.)

OILS, FATS AND WAXES.—A firm of commission agents in Helsingfors desires to secure the representation for Finland of British exporters of vegetable oils (including coconut, palm-kernal palm, raw and boiled linseed, rape seed and olive) also coconut acid oil, animal fats and oils, tallow, fish oils, mineral oils, ceresin and Japan wax. (Reference No. 590.)

SULPHATE OF COPPER.—An agent, established at Nantes, is desirous of obtaining the representation of British firms for the sale in France of sulphate of copper.

MUNITIONS PLANT FOR THE ARGENTINE.—H.M. Chargé d'Affaires at Buenos Aires states that the Argentine Foreign Purchases Commission to Europe to make purchases of armaments and munitions for the Argentine Army will arrive in England in June. The purchases to be effected comprise armaments and munitions, aviation material, army medical equipment and plant for munition factories. Reference No. 9228 F.L./E.C.

The Manchester Chemical Market

[FROM OUR OWN CORRESPONDENT,]

Manchester, May 22, 1924.

HEAVY chemicals have attracted hardly any more attention here this week than at any time during the past month or two, and so far as the home trade is concerned until the consuming industries, particularly textiles, are more active, no great increase in the amount of business can be expected. Overseas trade also is only of moderate extent, with the exception of one or two lines, although inquries are coming through. In the meantime, values are fairly steady on the whole; here and there, however, a further slight weakening is to be observed.

Heavy Chemicals

Saltcake is still a rather dull section of the market; for home consumption quotations stand at £3 10s. per ton, and for export £3 f.o.b. Prussiate of soda meets with a poor inquiry and prices are easy at 4½d. per lb. Chlorate of soda is unchanged from last week at 2¾d. per lb., but only a moderate amount of business is being done. Sulphide of sodium is fairly steady at £14 10s. to £14 15s. per ton for 60-65 per cent. concentrated solid and £9 10s. per ton for crystals, although little improvement in the demand for this material can be reported. Nitrite of soda is only in moderate request at £28 per ton. The demand for bleaching powder is on the slow side but values are unchanged at £10 per ton. Glauber salts are maintained at about £3 10s. per ton; business, however, continues on quiet lines. Caustic soda is still one of the few active sections for home consumption and for shipment; quotations are steady at from £16 17s. 6d. per ton for 60 per cent. to £19 7s. 6d. for 76-77 per cent. material. Alkali is in quietly steady demand both for home and export; current values for the former are unchanged at £6 15s. per ton for 58 per cent. quality. Hyposulphite of soda is in small demand and easier at £14 to £14 10s. per ton for photographic crystals and £9 15s. for commercial. Bichromate of soda is steady and in moderate request at 4½d. per lb. Phosphate of soda is in quiet demand and prices steadier at £13 10s. to £14 per ton. Bicarbonate of soda is maintained at £10 10s. per ton; transactions are, however, still on a small scale. Soda crystals are moderately active at £5 5s. per ton. Acetate of soda is slightly easier at £23 10s. per ton and buying interest is only small.

Caustic potash is steady and in fair demand at £29 to £30 per ton for 90 per cent. material. Carbonate of potash is on offer at £24 to £24 10s. per ton. Chlorate of potash is easy and in moderate inquiry at 2¾d. per lb. Yellow prussiate of potash is about unchanged from last week at 8½d. per lb. but the demand continues slow. Permanganate of potash is quiet at 7d. to 8d. per lb. Bichromate of potash is attracting a fair amount of attention at 5¾d. per lb.

Arsenic is easier at £59 per ton, Manchester, for white powdered, Cornish makes; actual business in this article is still quiet. Sulphate of copper is steady but only in moderate request at £24 10s. per ton, f.o.b. Commercial Epsom salts are offering at about £4 10s. per ton; magnesium sulphate, B.P., is quoted at £6 10s. Buying interest in acetate of lime is rather restricted; values, however, are fairly steady at £19 per ton for grey, and £14 10s. to £15 for brown. Acetate of lead, white, is a shade easier at £48, with brown about unchanged at £47 per ton. Nitrate of lead is only in moderate demand at £44 to £45 per ton.

Acids and Tar Products

Tartaric acid is now quoted at about 1s. 2d. per lb., a quietly steady demand being met with. Citric acid is well maintained at round 1s. 6d. per lb. Acetic acid is in fairly good inquiry at £47 to £48 per ton for 80 per cent. technical and £70 for glacial. Oxalic acid is featureless at 5d. per lb.

Among coal-tar products creosote oil is inactive at 7½d. to 7¾d. per gallon. Pitch has maintained its recent slight recovery, £3 5s. per ton being to-day's average quotation here. Carbolic acid is still quiet and easy at 7¾d. per lb. for crystal and 1s. 9d. to 2s. per gallon for crude. Naphthalenes are attracting only small attention; refined is offering at about £16 per ton and crude at £6 and upwards. Solvent naphtha is steady, though about unchanged at 1s. 5½d. to 1s. 6d. per gallon.

Company News

SAMUEL BARLOW AND CO.—An interim dividend has been declared of 5 per cent. actual on the ordinary shares.

CASSEL CYANIDE.—The directors have resolved to pay, on June 2, an interim dividend of 3d. per share, less tax, the same as a year ago.

LONDON NITRATE CO.—An interim dividend of 1s. 6d. per share, free of tax, is payable on June 2. Last year 1s. per share was paid.

SANTA CATALINA NITRATE CO., LTD.—The directors have declared an interim dividend of 7½ per cent., or 1s. 6d. per share, less tax, payable on June 23.

PARKE'S DRUG STORES, LTD.—A resolution altering the title of the company to Parkes Chemists, Ltd., was passed at a confirmatory meeting held on May 14.

ANGELA NITRATE CO., LTD.—The directors have decided to recommend at the annual meeting a final dividend of 15 per cent. less tax, making a total of 25 per cent. for the year 1923.

NORTH BROKEN HILL.—It is announced that a dividend (No. 58) of 2s., plus a bonus of 1s. per share, less tax, has been declared payable on June 30 to holders on the register on May 28.

MANGANESE BRONZE AND BRASS.—The accounts for the year 1923, after deducting £7,188 for interest on first mortgage debentures and including £11,762 brought forward, show a credit balance of £3,982 to be carried forward.

CHLORIDE ELECTRICAL STORAGE.—A final dividend is announced of 5 per cent., and a bonus of 2s. per share, making 20 per cent. for the year ended March 31, against 15 per cent. for the preceding year when the bonus was 1s. per share.

A. B. FLEMING AND CO.—Report states that, including £10,498 brought in, the amount at the credit of the profit and loss account for the year ended April 30 last, is £41,142. The directors recommend a dividend of 15 per cent., the same as for the previous year.

WILLIAM GOSSAGE AND SONS, LTD.—The transfer books relative to the 5 per cent. first cumulative preference shares were closed on May 17 and will remain closed until May 31, both days inclusive, for the purpose of preparing and issuing dividend warrants, due on June 1.

ANGLO-CHILIAN NITRATE AND RAILWAY CO.—The holders of the 4½ per cent. consolidated mortgage bonds are informed that the directors are prepared to offer £95 for each bond of £100 surrendered to the company with the coupon falling due on November 1, 1924, and all subsequent coupons attached.

CRAIG AND ROSE.—The net profit for the year to March 31 last amounted to £14,094, to which is added £6,291 brought in, making a total of £20,385. After paying the preference dividend, the directors recommend a dividend on the ordinary shares of 6 per cent., free of tax, for the year. After writing off goodwill, £3,000, there is a balance of £6,385 to be carried forward.

SANTA RITA NITRATE CO.—The report for the year 1923 states that the gross trading profits, including interest and transfer fees, after allowing £3,170 for caliche extracted and used, were £24,209. After deducting London expenses and corporation profits tax, amounting to £3,537, there is a net profit of £20,672. A dividend of 15 per cent. is recommended, and a balance of £5,672 will be carried forward.

NITRATE PRODUCERS' STEAMSHIP CO.—The accounts for the year to April 30 last show a profit of £39,981, and £31,693 was brought in, making a total of £71,674. A final dividend at the rate of 7½ per cent. per annum is proposed, plus a bonus of 2½ per cent., both free of tax, making 10 per cent. for the year, the same as for the previous year. The annual meeting will be held at 20, Billiter Buildings, London, E.C., on May 28 at 11.30

NOBEL INDUSTRIES, LTD.—The directors state that they have now received particulars of the results of the constituent and associated companies for the year 1923, which will enable them to declare a dividend on the ordinary shares as at July 1, payable on that date, on account of the year ended December 31, 1923, of 8 per cent., less tax, at 4s. 7½d. in the £1. For the year 1922 the dividend was 7 per cent., while for 1921 5 per cent. was paid.

WALL PAPER MANUFACTURERS.—The company announce that the claim with regard to their remaining interests in the factory at Altona has been settled for £37,000 by Mixed Arbitral Tribunal. As this claim stood at a nominal figure in the last balance sheet, the present year's accounts will benefit by about £13,000, and the rest of the sum will be received as and when the clearing office have funds available for further dividends.

ALIANZA CO., LTD.—The annual general meeting will be held at Calle Prat 268, Valparaiso, Chile, on July 23. The transfer books will be closed from June 6 to June 20 in connection with the proposed payment of a second interim dividend of 20s. per share (20 per cent.), making 40 per cent. for the year, in addition to 60 per cent. bonus paid in November, 1923, out of accumulated profits. In view of the payment of this interim dividend it is not intended to recommend any further dividend in respect of the year 1923.

AMALGAMATED ZINC (DE BAVAY'S).—The report for the half-year ended December 31 last shows that after transferring £6,080 to reserve for depreciation the gross profit on the working account was £29,798. Including £20,064, dividends received on shares in other companies, and allowing for profit and loss debits, the net profit transferred to appropriation account was £45,004, which, added to the balance brought forward, made available £60,814, from which dividends Nos. 34 and 35 were paid, leaving a credit balance of £10,814 carried forward.

TARAPACA AND TOCOPILLA NITRATE CO., LTD.—Speaking at the annual meeting in London on Monday, Sir Robert Harvey said that the steady improvement he was able to report at their last general meeting had been fully maintained and that prospects for the future looked promising. The balance of their production from oficina Virginia and a good part of the Santa Fe make were sold during the year at remunerative prices, and yielded, with the iodine profits, income from investments, and transfer fees, a gross profit of £59,509, leaving, after deduction of London expenses, interest, cables, and provision for income tax and corporation profits duty, a net result of £43,634. After adding last year's carry-forward of £54,682 they have an available balance of £98,316.

MOZAMBIQUE PORTLAND CEMENT CO., LTD.—Recent cabled advice saying that the duty on cement imported into the Province of Mozambique has been increased from 10 per cent. ad valorem (about 6s. per ton) to 45s. per ton appears to be of great importance to the Mozambique Portland Cement Co., Ltd., who hold a charter from the Government giving the company the sole right to manufacture cement in the province. The present issued capital of the company is £100,000 in debentures and 239,300 ordinary shares of £1 each. The debentures are being dealt in around 101½–102. Dealings in the shares are expected to begin shortly. The company's plant is reported to be working very satisfactorily and is turning out a high grade of cement, which is stated far to exceed the requirements of British standard specification.

American Dyestuffs Production

ACCORDING to the report of the American Tariff Commission, the output of American dyes in 1914 was only 6,619,729 lb., valued at $2,470,896, and the industry at that time was chiefly made up of assembling plants where dye intermediates, chiefly from Germany, were converted into the finished products. The 1923 output was nearly fourteen times as large in volume and nearly twenty times as large in value as that of 1914, being 92,000,000 lb., valued at $50,000,000. This is the largest output to date, exceeding that of 1922 by 42 per cent. The French occupation of the Ruhr is attributed as partly responsible for the large increase in production in 1923 as compared with 1922, as this led to an appreciable export of American dyes.

Recent Wills

Mr. J. Walker Leitch, Huddersfield, Chairman of Lankshear, Wickstead and Co., Ltd., manufacturing chemists	£163,470
Mr. George Alexander Lockett, of Princes Gate, South Kensington, London, a director of the Liverpool Nitrate Co., Ltd.	£503,938

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that occur.

Mortgages and Charges

[*NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.*]

BELL (JOHN), HILLS AND LUCAS, LTD., London, S.E., manufacturing chemists. (M., 24/5/24.) Registered May 7, £2,000 debentures (filed under section 93 (3) of the Companies (Consolidation) Act 1908), present issue £1,500; general charge. *£2,500. April 5, 1922.

CHEMICAL AND TECHNICAL ENGINEERING CO., LTD., London, E.C. (M., 24/5/24.) Registered May 7, £100 debentures, part of £2,000; general charge. *700. December 31, 1923.

CINCOED (LLANDEBIE) LIME AND SILICA CO., LTD. (M., 24/5/24.) May 7, £6,000 debentures; general charge. *——. December 31, 1923.

CLOVER PAINT AND COMPOSITION CO., LTD., Liverpool. (M., 24/5/24.) Registered May 5, Trust Deed dated May 1, 1924, securing £40,000 debenture stock and premium of 10 per cent.; charged on properties at Liverpool, also general charge.

HEWETT'S WILLESDEN DYERS AND CLEANERS, LTD. (late Hewett and Reynolds, Ltd.). (M., 24/5/24.) Registered May 9, mortgage to Bank; charged on premises at Station Road, Harrow. *£1,700. December 31, 1923.

Satisfaction

GREGORY (WILLIAM), LTD., London, S.E., manufacturing chemists. (M.S., 24/5/24.) Satisfaction registered May 8, £720, part of amounts registered. January 18, 1921, February 9, 1922, and April 23, 1924.

London Gazette

Companies Winding Up Voluntarily

ANGLO-ITALIAN COMMERCIAL AGENCY, LTD. (C.W.U.V., 24/5/24.) W. S. Dawson, 31, Great James Street, Bedford Row, W.C., chartered accountant, appointed liquidator. Meeting of creditors at Anderton's Hotel, Fleet Street, London, E.C., on Friday, May 30, at 11 a.m.

BURGOYNE (B. E.), LTD. (C.W.U.V., 24/5/24.) R. W. Blackburn appointed liquidator.

ELLIOTT, HUGHES AND EASTER, LTD. (C.W.U.V., 24/5/24.) W. H. Hunter, chartered accountant, of 51-52, Chancery Lane, London, W.C.2, appointed liquidator.

Bankruptcy Information

EMPRESS MANUFACTURING CO. (R. Rennie JARVIE), 62, Robertson Street, Glasgow. (S.B., 24/5/24.) Estates sequestrated May 15. Meeting to elect trustee and commissioners on Tuesday, May 27, at 12 noon, in the Faculty Hall, St. George's Place, Glasgow.

Notice of Intended Dividend

YOUNG, James Albert, Mere Hall Grease Works, Bangor Street, Bolton, grease manufacturer. Last day for receiving proofs, June 4, Trustee, J. G. Gibson, Byrom Street, Manchester, official receiver.

Partnership Dissolved

JACKSON (W. and H.) (William Bankin JACKSON and George Henry WOOD, Junior), wholesale druggists and oil merchants, 13/17, Lydia Ann Street, Liverpool, by mutual consent as from May 12, 1924. Debts received or paid by G. H. Wood, Junior, who continues the business.

New Companies Registered

EDWARD CASH AND CO., LTD., 5, Norfolk Street, Bradford. Chemists, drysalters, manufacturers of and dealers in chemicals of all kinds, dyewares, colours, oils, soaps, etc. Nominal capital, £5,000 in £1 shares.

HOPKINS AND HOBDAY, LTD., Mundesley Street, Reading, Berks. Manufacturers of and dealers in wood pulp and all other materials from which paper can be manufactured, colouring matters, stains, dyes and pigments, etc. Nominal capital, £3,000 in 2,000 6 per cent. cumulative preference shares and 1,000 ordinary shares of £1 each.

MINERAL OILS SEPARATION, LTD., 3, Finsbury Court, Finsbury Pavement, London, E.C. To acquire patent rights relating principally to the process of and apparatus for the fractional distillation of oils from oil shale or similar materials, etc. Nominal capital, £15,000 in £10 shares.

MORRISON RODGERS, LTD., 16, Burley Road, Leeds. Manufacturing chemists, druggists and drysalters. Nominal capital, £500 in £1 shares.

Report on Atmospheric Pollution

IN the Ninth Report of the Committee for the Investigation of Atmospheric Pollution for the year ended March 31, 1923, it is shown that there was a distinct improvement in the purity of the air during the year as compared with the average of preceding years. An interesting table is given showing the places with the highest and lowest deposits for the year. The highest total deposit was at Rochdale and the lowest at Rothamsted; the greatest amount of tar was deposited in Newcastle-on-Tyne while the highest deposit of sulphates was found in Southwark Park, London.

One section deals with the results obtained with what is known as the automatic filter, an instrument which measures hour by hour throughout the day and night the amount of impurity suspended in the air. The measure is in this sense distinct from that of the impurity which collects in an open gauge. The curves of the suspended impurity derived from the instrument show in all places a maximum in the forenoon. The distribution over the 24 hours is very suggestive. There is a curious tendency in London towards a reduction in suspended impurity towards the end of each week.

Another section deals with an instrument called the jet dust counter which secures the microscopic examination of dust particles and their number, irrespective of their colour or nature. The use of the instrument has extended rapidly both in England and in foreign countries. Its high efficiency and convenience of operation make it of great value in the examination of all problems connected with air-borne dust. Some curiously interesting results have been obtained with this instrument, as, for example, the discovery of spherical glassy particles in the air, the sudden appearance of large numbers of mould cells in the air during the autumn—traced to falling leaves—and the occasional presence of crystals of soluble salts in the air.

Results of Oxygen Starvation

PROFESSOR JOSEPH BARCROFT, lecturing on Tuesday, May 13, at the Royal Institution, on "The Effect of Altitude on Man," remarked that acute want of oxygen might be brought about in more than one way; that perhaps most frequently discussed at present was coal gas poisoning. The gas which was responsible for the symptoms got into the blood and there blocked the oxygen transport, so that the effect on the tissues of the body was the same as if oxygen was withheld in a corresponding degree. The same was true of gas poisoning in mines, and the classical description of the symptoms was that given by the late Sir Clement Le Neve Foster, who was severely but not fatally poisoned in the mine at Snaefell after the appalling accident that took place there in the nineties. Foster, believing delivery to be hopeless, wrote down everything which was in his mind; gradually it became less coherent—it consisted, as with the drunken man, largely of repetitions. Chronic oxygen want, such as one became familiar with in the Andes, spelt querulousness and lack of concentration. All the simple mental processes went smoothly enough, but the more complicated ones were at fault or carried out with difficulty.